CITYSCAPE

COMMERCIAL OFFICE & WAREHOUSE

144 BENTLEY AVENUE, OTTAWA, ONTARIO

SPECIFICATIONS

PROJECT No. SL-1020-20

January 6, 2021

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END OF SECTION

1 SUBSTITUTIONS DURING THE BIDDING PERIOD

.1 Generally, specific materials, products and systems are specified in the Contract Documents to provide a standard of acceptance. Except where substitutions are specifically excluded in the individual Sections of the specification, equivalent materials, products or systems by other manufacturers are acceptable as substitutions, provided that the properties and compliances of the substitutions meet or exceed the properties and compliances of the specified materials, products and systems in all respects and that items exposed to sight are of the same appearance as the specified items.

.2 Substitutions which do not satisfy the above requirements may be rejected by the construction Manager or the Consultant. Materials, products and systems which are so rejected shall be replaced by the specified items at no cost to the Contract.

.3 In the event that, prior to closing of bids, the Bidder wishes to offer a substitution or a proposal of work, materials or methods as an alternative to those described in the Contract Documents, he shall submit a request in writing no later than the time specified herein.

.4 The request shall include the following:
- .1 A description of the proposed substitution.
- .2 In the case of materials, products or systems, a direct comparison between the properties and compliances of the specified materials, products or systems with the properties and compliances of the proposed substitution, arranged in tabular form, in the same sequence as specified in the applicable specification section or in the sequence listed in the specified manufacturer's published literature, as appropriate.
- .3 In the case of materials or products, country of manufacture.
- .4 Shop drawings, product data, and certified test results attesting to the proposed material or product equivalence.
- .5 If requested by the Construction Manager or the Consultant, a list of no less than five projects of comparable size and complexity, where the proposed substitution has been used in a similar application. Such projects shall have been in service for at least five (5) years and, where applicable, shall have been subjected to climatic conditions similar to those experienced at the location of the Project. The list shall include the name and current telephone number of the Architect or Prime Consultant for each project.

.5 The burden of proof is on the proposer. In the event that the Construction Manager or the Consultant deems the information provided with the request for approval of a substitution to be inadequate, the request may be rejected.

.6 A request constitutes a representation that the Bidder:
- .1 Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
- .2 Will provide the same warranty for the Substitution as for the specified Product.
- .3 Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to the Owner. (A later claim by Bidder for an addition to Contract Price because of changes in work necessitated by use of substitutions shall not be considered).

.4 Waives claims for additional costs or time extension which may subsequently become apparent.
.5 Will reimburse the Owner and the Consultant for the cost of review or redesign services associated with re-approval by authorities.

.7 Substitutions will not be considered in either of the following circumstances:
.1 When they are indicated or implied on shop drawing or product data submittals, without a separate written request having been made.
.2 When acceptance will require revision to the Contract Documents.

.8 Where the terms "or equal", "or equivalent" or terms of similar meaning are used in the specifications, this shall not be construed as acceptance of any alternative material, product or system to those specified. The use of these terms does not relieve the Subcontractor from his responsibility to follow the procedures for approval of substitutions specified herein.

.9 When a request to substitute a Product is accepted, the Construction Manager will issue an Addendum to known bidders.

2 SUBSTITUTIONS AFTER CONTRACT AWARD

.1 No substitutions will be permitted after award of the Contract without the prior approval of the Consultant by means of a letter of acceptance of the specific substitution.

.2 In the event that the Trade Contractor wishes to offer a substitution or a proposal of work, materials or methods as an alternative to those described in the Contract Documents, he shall submit a request in writing.

.3 The request shall include the following:
.1 Reasons for the proposed substitution.
.2 A description of the proposed substitution.
.3 The amount of any credit offered for the substitution.
.4 In the case of materials, products or systems, a direct comparison between the properties and compliances of the specified materials, products or systems with the properties and compliances of the proposed substitution, arranged in a form acceptable to the Construction Manager and the Consultant.
.5 In the case of materials or products, country of manufacture.
.6 Shop drawings, product data, and certified test results attesting to the proposed material or product equivalence.
.7 If requested by the Construction Manager or the Consultant, a list of no less than five projects of comparable size and complexity, where the proposed substitution has been used in a similar application. Such projects shall have been in service for at least five (5) years and, where applicable, shall have been subjected to climatic conditions similar to those experienced at the location of the Project. The list shall include the name and current telephone number of the Architect or Prime Consultant for each project.

.4 The Construction Manager and the Consultant reserve the right to request such additional information as they deem necessary prior to acceptance or rejection of a proposed substitution.

.5 A request constitutes a representation that the Trade Contractor:
- .1 Has investigated proposed Product and determined that
  - .1 it meets or exceeds the quality level of the specified Product; or
  - .2 the request describes accurately and completely the specific ways in which it fails to meet the quality level of the specified Product.
- .2 Will provide the same warranty for the Substitution as for the specified Product.
- .3 Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to the Owner. (A later claim by Bidder for an addition to Contract Price because of changes in work necessitated by use of substitutions shall not be considered).
- .4 Waives claims for additional costs or time extension which may subsequently become apparent.
- .5 Will reimburse the Owner and the Consultant for the cost of review or redesign services associated with re-approval by authorities.

.6 When a request to substitute a Product is accepted, the Construction Manager will issue to the Trade Contractor a formal letter of acceptance.

END OF SECTION

1 COORDINATION AND PROJECT CONTROL

.1 Cooperate with the Construction Manager in the coordination of the progress of the Work, progress schedules, submittals, the use of the site, temporary utilities, construction facilities and controls and the relationship of the work of the Trade Contractor to the work of the various sections of the specifications to ensure the efficient and orderly installation of interdependent construction elements.

.2 Coordinate the work with the work of the various sections having interdependent responsibilities for installing, connecting to and placing in service utilities and equipment.

.3 Where applicable, coordinate space requirements, supports and the installation of mechanical and electrical work which is indicated schematically on the drawings. Follow the routing shown for pipes, ducts and conduits as closely as possible; place runs parallel with lines of the building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs.

.4 Except where indicated otherwise, in finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings. Coordinate locations of fixtures and outlets with finished elements. Before installation, inform the Construction Manager if there is a contradictory situation. Install as directed by the Construction Manager.

.5 Where applicable, complete and clean up the work in preparation for Substantial Completion.

.6 After Owner occupancy of the premises, coordinate access to the site for correction of defective work and work not in accordance with the Contract Documents, to minimize disruption of the Owner's activities.

2 DOCUMENTS REQUIRED

.1 The Construction Manager will maintain at the Project Site, one copy each of the following:
- .1 Contract drawings.
- .2 Specifications
- .3 Addenda
- .4 Reviewed shop drawings.
- .5 Change orders.
- .6 Other modifications to the Contract.
- .7 Field test reports.
- .8 The latest approved version of the construction schedule.
- .9 The latest edition of the Ontario Building Code and other applicable codes and regulations, c/w all revisions.
- .10 A complete set of all standards referenced in the Specifications Sections.
- .11 Manufacturers' installation and application instructions.

.2 The Trade Contractor and all Subcontractors will be given access to a set of Contract Documents. The Trade Contractor is responsible for having access to the latest edition of codes, regulations and standards that are applicable to the Trade Contractor's portion of the Work.

3 INTERFERENCE DRAWINGS

.1 When directed by the Construction Manager, prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the spaces provided.

.2 Where the relationship of a system with other systems is critical, prepare drawings to indicate coordination and methods of installation. Ensure that all details of equipment apparatus and connections are coordinated.

.3 Ensure that clearances required by authorities having jurisdiction and clearances for proper maintenance are indicated on the drawings.

.4 Provide all line and layout from the information provided on the Contract Drawings.

4 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

.1 Power requirements: Where applicable, coordinate the Work with the electrical contractor to ensure the provision of required electrical power with the appropriate electrical characteristics.

.2 Wiring terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes and materials indicated. Size terminal lugs to NFPA 70. Include lugs for terminal boxes.

.3 Cord and plug: Where not otherwise specified in the individual specification Sections, provide minimum 1.8 m cord and plug, including grounding connector for connection to electric wiring system.

END OF SECTION

1 PRECONSTRUCTION MEETING

.1 The Construction Manager will schedule a preconstruction meeting with Trade Contractors, after award of Contract.

.2 Agenda:
- .1 Execution of Project Contract Agreement.
- .2 Submission of executed bonds and insurance certificates.
- .3 Distribution of Contract Documents.
- .4 Submission of List of Subcontractors, Price Breakdown, Contract Price, Unit Prices, Construction Schedule and Proposed Product List.
- .5 Designation of the personnel representing the parties in the Contract.
- .6 Procedures and processing of field decisions, submittals, substitutions, applications for payments, Proposal Change Requests, Change Orders and Contract closeout.
- .7 Scheduling.
- .8 Scheduling of activities of independent inspection and testing laboratories.
- .9 Terms of Payment and proposed cash flow for the project.
- .10 Project meeting procedures.

.3 The Construction Manager will record minutes and distribute copies to meeting participants and affected parties not in attendance.

2 SITE MOBILIZATION MEETING

.1 The Construction Manager will schedule a mobilization meeting at the Project Site, prior to Contractor occupancy. Attendance by:
- .1 The Construction Manager
- .2 The Consultant
- .3 Specialized sub-consultants.
- .4 Major Trade Contractors.

.2 Agenda:
- .1 Use of the premises by Trade Contractors.
- .2 Construction facilities and controls.
- .3 Temporary facilities.
- .4 Survey and building layout.
- .5 Security and housekeeping procedures.
- .6 Construction Schedule.
- .7 Application for payment procedures.
- .8 Procedures for testing.
- .9 Procedures for maintaining record documents.
- .10 Requirements for start-up of equipment.
- .11 Inspection and acceptance of equipment put into service during the construction period.

.3 The Construction Manager will record minutes and distribute copies to meeting participants and affected parties not in attendance.

3 PROGRESS MEETINGS

.1 The Construction Manager will schedule progress meetings at the Project Site, at the same time and day of the week, at two-weekly intervals throughout the progress of the Work. By agreement, additional meetings may be held if circumstances require.

.2 Attendance required (as appropriate to agenda topics for each meeting):
- .1 The Construction Manager
- .2 The Consultant
- .3 Specialized sub-consultants.
- .4 Major Trade Contractors
- .5 Other Trade Contractors affected by the Work.

.3 Subcontractors and/or suppliers shall be invited only by prior agreement with the Consultant.

.4 The Constuction Manager will:
- .1 Distribute written notices of meetings to all affected parties.
- .2 Provide physical space and make arrangements for meetings.

.5 Agenda:
- .1 Review of minutes of previous meetings.
- .2 Review of Work progress.
- .3 Field observations, problems and decisions. progress.
- .4 Identification of problems which impede planned progress.
- .5 Review of Schedule of Submittals and status of submittals.
- .6 Review of off-site fabrication and delivery schedules.
- .7 Maintenance of Progress Schedule.
- .8 Corrective measures to regain projected schedules.
- .9 Planned progress during succeeding work period.
- .10 Coordination of projected progress.
- .11 Maintenance of quality and work standards.
- .12 Effect of proposed changes on the Progress Schedule and coordination.
- .13 Other business relating to the Work.

.6 The Construction Manager will record minutes. Minutes will include significant proceedings and decisions and will identify "action by" parties.

.7 The Construction Manager will distribute copies to meeting participants and affected parties not in attendance.

4 PREINSTALLATION MEETINGS

.1 When required by individual Sections of the Specification, the the Construction Manager will:
- .1 Convene a preinstallation meeting at the site or at an appropriate location, prior to commencing the work of the Section.
- .2 Require the attendance of parties directly affecting or affected by the work of the Section.
- .3 Distribute written notice of the meeting to all parties required to attend.

.4 Prepare the agenda and preside at the meeting:
  .1 Review conditions of installation, preparation and installation procedures.
  .2 Review coordination with related work.

.5 Record minutes and distribute copies to meeting participants and affected parties not in attendance.

END OF SECTION

1 GENERAL

.1 Submit to the Construction Manager for review by the Construction Manager and the Consultant for review, shop drawings, product data and samples specified in the respective specification Sections.

.2 Until a submission is reviewed, work involving the relevant product may not proceed.

.3 Arrange and pay for all deliveries and pick-ups to and from the office of the Construction Manager.

2 SHOP DRAWINGS

.1 Drawings to be originals prepared by the Trade Contractor, Subcontractor, Supplier or Distributor, which illustrate the appropriate portion of the Work; showing fabrication, layout, setting or erection details, as specified in the appropriate Sections.

.2 Identify content of shop drawings by reference to specification Section numbers.

.3 Identify details by reference to sheet and detail numbers shown on the Contract Drawings.

.4 Drawing Format Submissions:
- .1 Digital files in .pdf format.
- .2 Upon return to the Trade Contractor of reviewed digital submissions, the Trade Contractor shall be responsible for printing and distribution of reviewed submissions to the appropriate Subcontractors and affected parties.

.5 Product Data:
- .1 Certain specification Sections specify that manufacturer's standard schematic drawings, catalogue sheets, illustrations and other standard descriptive data will be accepted in lieu of shop drawings.
- .2 The above will be accepted only if they conform to the following:
  - .1 Delete information which is not applicable to project.
  - .2 Supplement standard information to provide additional information applicable to project.
  - .3 Show dimensions and clearances required.
  - .4 Show performance characteristics and capacities.
  - .5 Show wiring diagrams (where applicable) and controls.
- .3 Submit as .pdf files.

3 PRODUCT DATA

.1 Certain specification Sections specify that manufacturer's standard schematic drawings, catalogue sheets, illustrations and other standard descriptive data will be accepted in lieu of shop drawings.

.2 The above will be accepted only if they conform to the following:
- .1 Delete information which is not applicable to project.
- .2 Supplement standard information to provide additional information applicable to project.
- .3 Show dimensions and clearances required.

.4 Show performance characteristics and capacities.
.5 Show wiring diagrams (where applicable) and controls.

4 SAMPLES AND MOCK-UPS

.1 Submit samples in sizes and quantities specified.

.2 Where colour, pattern or texture is criterion, submit full range of samples.

.3 Construct field samples and mock-ups at locations acceptable to the Construction Manager.

.4 Coordinate with related other trades to construct each sample or mock-up complete, including the work of all trades required to finish the work.

.5 Reviewed samples or mock-ups will become standards of workmanship and material against which, installed work will be checked on project.

5 COORDINATION OF SUBMISSIONS

.1 Review shop drawings, product data and samples prior to submission.

.2 Verify:
.1 Field measurements.
.2 Field construction criteria.
.3 Catalogue numbers and similar data.

.3 Coordinate each submission with the requirements of the Work and the Contract Documents. Individual shop drawings will not be reviewed until all related drawings are available.

.4 The Trade Contractor's responsibility for errors and omissions in submission is not relieved by the Construction Manager's and/or the Consultant's review of submittals.

.5 The Trade Contractor's responsibility for deviations in submission from the requirements of the Contract Documents is not relieved by the Construction Manager's and/or the Consultant's review of the submission, unless the Construction Manager gives written acceptance of specified deviations.

.6 Notify the Construction Manager and the Consultant, in writing at the time of submission, of deviations from the requirements of the Contract Documents.

.7 After the Construction Manager's and the Consultant's review, the mylar or sepia shop drawing or one copy of the trade literature format submission will be returned to the Construction Manager who will distribute copies to affected parties, including record copies of each shop drawing for the Consultant.

.8 Originators preparing more than one submission, shall prepare a list of all shop drawings, complete with submission dates, to the Construction Manager. This list shall be included with the first submission.

6 SUBMISSION REQUIREMENTS

.1 Schedule submissions at least twenty (20) days before the dates reviewed submissions will be needed.

.2 Accompany each submission with a transmittal letter, in duplicate, containing:
- .1 Date.
- .2 Project title and number.
- .3 Applicable Specification Section number.
- .4 Trade Contractor's name and address.
- .5 Number of each shop drawing, product data and sample submitted.
- .6 Other pertinent data.

.3 Submissions shall include:
- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name of:
  - .1 Trade Contractor.
  - .2 Subcontractor.
  - .3 Supplier.
  - .4 Manufacturer.
  - .5 Separate detailer when pertinent.
- .4 Identification of product or material.
- .5 Relation to adjacent structure or materials.
- .6 Field dimensions, clearly identified as such.
- .7 Specification Section number.
- .8 Applicable standards, such as CSA or CGSB numbers.
- .9 Originator's stamp, on the front face of the submission initialled or signed certifying review of submission, verification of field measurements and compliance with Contract documents.
- .10 Trade Contractor's stamp, on the front face of the submission initialled or signed certifying review of submission.
- .11 Professional Engineer's stamp and signature, on the front face of the submission where specific sections of the specification so direct. Note that drawings will not be reviewed unless the Professional Engineer's stamp and signature is present.
- .12 CSA/CGSB/ASTM or other conformance certificates where applicable.

.4 The Trade Contractor's stamp, certifying review of Submission shall be interpreted to mean that the Trade Contractor has reviewed the Drawings and coordinated them with the work of other trades. Drawings which have not been so reviewed and coordinated by the Trade Contractor will be returned for resubmission before Construction Manager and Consultant review will be undertaken.

7 SHOP DRAWINGS REVIEW

.1 The review of shop drawings by the Construction Manager and/or the Consultant is for the sole purpose of ascertaining conformance with the general concept. This review shall not mean that the Construction Manager and the Consultant approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Trade Contractor submitting same, and such review shall not relieve the Trade Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the Contract Documents.

.2 Without restricting the generality of the foregoing, the Trade Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the work with all interdependent trades.

END OF SECTION

1 RESPONSIBILITY

.1 Each Trade Contractor shall assume responsibility for safety of persons and property on site and for protection of persons off site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 Execute the terms of the Contract in strict compliance with the requirements of the *Occupational Health and Safety Act*, R.S.O. 1990, c.0.1 (the "Act") and Ontario Regulation 213/91 (which regulates Construction Projects) and any other regulations under the Act (the "Regulations") which may affect the performance of the Work. The Construction Manager will assume the role and responsibilities of the "constructor" or "employer", as defined by the Act, as the case may be. In support of the Construction Manager, each Trade Contractor shall ensure that:

.1 worker safety is given first priority in planning, pricing and performing the Work;

.2 its officers and supervisory employees have a working knowledge of the duties of a "constructor and "employer" as defined by the Act and the provisions of the Regulations applicable to the Work, and a personal commitment to comply with them;

.3 a copy of the most current version of the Act and the Regulations are available to the Trade Contractor at the Place of Work;

.4 workers employed to carry out the Work possess the knowledge, skills and protective devices required by law or recommended for use by a recognized industry association to allow them to work in safety;

.5 supervisory employees carry out their duties in a dilligent and responsible manner with due consideration for the health and safety of the workers; and

.6 all Trade Contractors, Subcontractors and their employees are properly protected from injury while they are at the Place of Work.

.4 The Construction Manager will present a project-specific the health and safety policy and program at the preconstruction meeting. Trade Contractors shall respond promptly to requests from the Construction Manager and/or the Consultant, for confirmation that the methods and procedures for carrying out the Work comply with the Act and Regulations. Cooperate with the Construction Manager and the Owner's representatives appointed to enforce the Act and Regulations in any investigations of worker health and safety in the performance of the Work. Indemnify and save the Owner harmless from any additional expense which the Owner may incur to have the Work performed as a result of the Trade Contractor's failure to comply with the requirements of the Act and the Regulations.

.5 Prior to commencement of the Work, provide a list of those products controlled under the Workplace Hazardous Materials Information System (WHMIS), which are proposed for use on the project. Include in the submission related Materials Safety Data Sheets. All containers used in the application of products controlled under WHMIS shall be labelled. Notify the Construction Manager of changes in writing and provide relevant Materials Safety Data Sheets.

.6 Trade Contractors shall each appoint an authorized representative to be on the site while any work is being performed, and to act for or on the Trade Contractor's behalf. Prior to commencement of construction, notify the Construction Manager of the names, addresses positions and telephone numbers of the Trade Contractor's representatives who can be contacted at any time to deal with matters relating to the Contract.

END OF SECTION

1 FIRES

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

2 DISPOSAL OF WASTES

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

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

.3 Dispose of waste or volatile materials which could be hazardous to the health, in strict accordance with the requirements of the authorities having jurisdiction and in a manner which will protect construction personnel, visitors to the site and the public from all such hazards.

3 DRAINAGE

.1 Where applicable, provide temporary drainage and pumping as necessary to keep excavations and the site free from water.

.2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

4 POLLUTION CONTROL

.1 Control emissions from equipment and plant to conform to local authorities' emission requirements.

.2 Prevent sandblasting and other extraneous materials from contaminating air beyond the application area by providing temporary enclosures.

.3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

END OF SECTION

1 REFERENCES AND CODES

.1 Perform the Work in accordance with the Ontario Building Code, OBC-2012, including amendments up to tender closing date and other codes of provincial and local application provided that, in case of conflict or discrepancy, the more stringent requirements apply.

.2 Meet or exceed requirements of:
- .1 The Contract documents.
- .2 Specified standards, codes and referenced documents.
- .3 Ontario Regulation for Industrial Establishments O.Reg. 851.
- .4 CAN/CSA-B651-12, Accessible Design for the Built Environment.

2 BUILDING SMOKING ENVIRONMENT

.1 Smoking is prohibited within the building.

3 PERMITS AND FEES

.1 The Trade Contractor shall pay for all permits, fees and inspections by all authorities having jurisdiction required for the Trade Contractor's work.

.2 The Owner will apply and pay for the Building Permit and any municipal development fees.

.3 The Contstruction Manager will be responsible for following up with the City, to facilitate the expeditious issue of the Building Permit.

.4 The Trade Contractor shall provide the Construction Manager with photocopies of all permits required for the Trade Contractor's work.

END OF SECTION

1 QUALITY ASSURANCE - CONTROL OF INSTALLATION

.1 Monitor quality control over suppliers, manufacturers, products, services, site conditions and workmanship to produce work of the specified quality.

.2 Comply with manufacturers' instructions, including each step in the sequence.

.3 Should manufacturer's instructions conflict with the Contract Documents, request clarification from the Consultant before proceeding.

.4 Comply with specified standards as a minimum quality for the Work, except where more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.

.5 Perform work by persons qualified to produce the required and specified quality.

.6 Wherever critical to a proper fit, verify dimensions on site prior to commencement of manufacture.

.7 Secure materials and products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

2 TOLERANCES

.1 Monitor fabrication and installation tolerance control of products to produce acceptable work. Do not permit tolerances to accumulate.

.2 Comply with manufacturers' tolerances. Should a manufacturer's tolerances conflict with the Contract Documents, request clarification from the Consultant before proceeding.

.3 Adjust products to appropriate dimensions; position products before securing in place.

3 REFERENCES, CODES AND STANDARDS

.1 Perform the Work in accordance with the latest edition, including all revisions, of applicable codes and regulations of federal, provincial, or local application, provided that, in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Meet or exceed the requirements of specified standards, codes and referenced documents.

.3 For materials, products or workmanship specified by association, trade or other consensus standards, comply with the requirements of the standard, except where more rigid requirements are specified or are required by applicable codes.

.4 In each case, where a standard, code or other document is referenced, the latest edition or revision shall apply, unless specified otherwise, except where a specific date of issue is established by code.

.5 Neither the contractual relationships, duties or responsibilities of the parties in the Contract shall be altered from those defined by the Contract Documents by mention or inference otherwise in any referenced document.

4 MOCK-UPS

.1 Procedures for the preparation and submission of mock-ups are specified in Section 01 33 00 "Submittal Procedures".

.2 Tests will be formed under the provisions identified in this Section.

5 INSPECTION AND TESTING

.1 Inspection:
- .1 Provide access to the Work at all times.
- .2 Provide full cooperation and sufficient, safe, and proper facilities at all times for review of the Work by and for inspection of the Work by authorized agencies.
- .3 If portions of the Work are in preparation off site, provide access to such work, whenever it is in progress.
- .4 Provide the Construction Manager and the Consultant with reasonable notice of when work designated for tests, inspections or approvals will be ready for review and inspection.
- .5 Provide the Construction Manager and the Consultant with reasonable notice of the date and time of inspections by other authorities.

.2 Independent Inspection Agencies:
- .1 Independent Inspection/Testing Agencies will be engaged by the Construction Manager for the purpose of inspecting and/or testing portions of the Work. The Cost of initial inspections and/or testing will be paid by the Owner.
- .2 Cooperate with Inspection/Testing Agencies. Furnish samples of materials, design mix, equipment, tools, storage, safe access and assistance by incidental labour as requested.
- .3 If additional tests are required by the Construction Manager, make arrangements with the Inspection/Testing Agency and pay for additional samples and tests.
- .4 The cost of additional inspection and/or testing required because of non-compliance with the Contract Documents at the initial test, shall be paid by the Trade Contractor.

.3 Reports: All inspection and test reports shall include for, one copy to each of the following:
- .1 The Construction Manager
- .2 The Consultant.
- .3 Applicable Specialist Consultant(s) (if applicable).
- .4 The Trade Contractor responsible for the work.
- .5 Material/product manufacturers and/or suppliers, as applicable.

.4 Covering Installed Work: Do not cover installed work with subsequent work until the installed work has been reviewed on site by the Construction Manager and the Consultant.

6 MANUFACTURERS' FIELD SERVICES

.1 When individual specification Sections require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment and testing, adjusting and balancing of equipment, as applicable, and to initiate instructions when necessary.

.2 Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to the manufacturer's written instructions.

.3 Refer to Section 01 33 00 "Submittal Procedures".

END OF SECTION

1 INSTALLATION/REMOVAL

.1 The Construction Manager will provide basic construction facilities and temporary controls. Trade Contractors shall provide additional facilities as required to execute their work expeditiously.

.2 Prior to Substantial Completion or when directed by the Construction Manager, remove from the site all construction facilities and temporary controls.

.3 Make good any damage to or disturbance of existing property caused by such work. Restore affected existing property to a condition at least equal to that which existed prior to construction.

2 TEMPORARY ELECTRICAL POWER

.1 The Construction Manager will provide and pay for temporary power required during construction for temporary lighting and operating of power tools.

.2 Connect to delivery points in accordance with the Canadian electrical Code and to the satisfaction of the local authority having jurisdiction. Provide all equipment and temporary lines to bring power services to the point of use. Provide flexible power cords as required.

.3 The permanent power system of the building may not be used during construction without the permission of the Construction Manager.

3 TEMPORARY LIGHTING

.1 The Construction Manager will provide and maintain general level temporary lighting for construction operations to achieve a minimum lighting level of 2 watts/sq.ft. (21 watts/m^2).

.2 Trade Contractors shall provide and pay for additional temporary lighting equipment required for the proper execution of specific tasks. Provide branch wiring from the power source to distribution boxes with lighting conductors, pigtails and lamps, as required.

.3 The Construction manager will provide and maintain temporary lighting to interior and exterior staging and storage areas, after dark, for security purposes.

.4 The permanent lighting system of the building may be used during construction, provided warranties are not affected.

4 TEMPORARY HEATING

.1 The Construction Manager will provide temporary heating required during the construction period, including attendance, maintenance and fuel, as required to maintain temperatures of minimum 10 deg.C in interior areas where construction is in progress.

.2 Trade Contractors shall provide and pay for additional heating where required for specific tasks.

.3 Construction heaters used inside the building must be vented to the outside or be flameless type. Solid fuel salamanders are not permitted.

.4 Ventilate heated areas and keep the building free of exhaust or combustion gases.

.5 Use of permanent heating system:

.1 The permanent heating system of the building, or portions thereof, may be used when available, subject to the approval of the Construction Manager, provided warranties are not affected.

.2 Prior to operation of permanent equipment for temporary heating purposes, verify that the installation is approved for operation, equipment is lubricated and filters are in place.

.3 Be responsible for damage thereto. Before takeover by the Owner, change all filters, vacuum all ductwork, replace any worn or consumed parts and perform such other maintenance work as required to leave the system in proper operating condition.

5 TEMPORARY VENTILATION

.1 Ventilate enclosed areas as required to cure materials, to dissipate humidity and to prevent accumulation of dust, fumes, vapours or gases.

.2 The permanent ventilation system of the building may be used, subject to the same provisions as specified above for the use of the permanent heating system and provided such use does not result in contamination of the air outside the area of construction. Extend and supplement the permanent equipment with temporary fan units as required to maintain clean air for construction operations.

6 TELEPHONE AND FACSIMILE

.1 The Construction Manager will provide telephone and facsimile macine for own use and the use of the Consultant. These facilities may be used by Trade Contractors, subject to the Construction Manager's approval.

.2 The cost of long distance telephone calls and telecopier transmissions shall be paid for by the respective party.

7 TEMPORARY WATER SERVICE

.1 The Construction Manager will provide and pay for water service required for construction use. Connect to delivery points to the approval the authorities having jurisdiction.

.2 Provide all equipment and temporary lines to bring water to the point of use. Provide flexible hoses as required.

8 SANITARY FACILITIES

.1 The Construction Manager will provide sufficient temporary sanitary facilities for construction personnel.

.2 Maintain the facilities in a clean and sanitary condition.

9 WEATHER ENCLOSURES

.1 The Construction Manager will provide weathertight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 The Construction Manager will enclose the building interior work area for temporary heat.

10 DUST-TIGHT SCREENS

.1 Provide dust-tight screens or partitions to localize dust generating activities, and for the protection of workers, finished areas of work and the public.

.2 Maintain and relocate protection until such Work is complete.

11 PROTECTION OF INSTALLED WORK

.1 Protect installed work and provide special protection where specified in individual specification Sections.

.2 Provide temporary and removable protection for installed products. Cooperate with other trades to control activity in the immediate work area to prevent damage.

.3 Where applicable, provide protective coverings at walls, projections, jambs, sills and soffits of openings.

.4 Where applicable, protect finished floors, stairs and other surfaces from traffic, dirt, wear, damage or movement of heavy objects by covering with durable sheet materials.

.5 The Construction Manager will prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, follow the recommendations for protection from the waterproofing or roofing material manufacturer.

.6 Prohibit traffic from landscaped areas.

12 SECURITY

.1 The Construction Manager will provide security and facilities as required to protect the Work from unauthorized entry, vandalism or theft.

13 STORAGE OF MATERIALS

.1 Do not unreasonably encumber site with materials or equipment. Store materials and equipment where directed by the Construction Manager. Move same when directed.

.2 Do not permit any part of the Work to be loaded with a weight or force which will endanger the safety of the Work or cause undue deflection.

14 FIELD OFFICES

.1 The Construction Manager will provide office space of sufficient size to accommodate site meetings.

15 PROJECT CLEANLINESS

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

.2 Remove debris and rubbish from pipe chases, plenums attics, crawl spaces or other closed or remote spaces.

.3 Broom and vacuum clean interior areas prior to the start of finish work; maintain areas free of dust and other contaminants during finishing operations.

.4 Remove waste material and debris from site and deposit in a designated waste container at the end of each working day.

.5 Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

16 PROJECT IDENTIFICATION SIGNAGE

.1 The Construction Manager will provide temporary project identification signage.

.2 No other signs are allowed, except those required by law, without the Consultant's prior permission.

END OF SECTION

1 REFERENCE STANDARDS

.1 Within the individual specifications Sections, reference standards are identified. Conform to these standards, in whole or part, as specifically specified.

.2 Conform to latest date of issue of referenced standards in effect on the date of submission of tenders, except where a date or issue is specifically noted.

2 QUALITY

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

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

3 PRODUCT AVAILABILITY

.1 Immediately review material and product delivery requirements and anticipate foreseeable supply delays for any items. Notify the Construction Manager.

.2 In the event of failure to notify the Construction Manager at the commencement of the Work, the Construction Manager reserves the right to substitute more readily available products of similar character, at no increase in the Contract Price.

4 TRANSPORTATION AND HANDLING

.1 Transport and handle materials and products in accordance with the manufacturer's instructions.

.2 Promptly, upon arrival on site, inspect shipments to ensure that products comply with the requirements, quantities are correct and materials and products are undamaged.

.3 Handle and store materials and products in a manner which will prevent damage, adulteration, deterioration and soiling and in accordance with the manufacturer's instructions when applicable.

5 STORAGE AND PROTECTION

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

.2 Store sensitive materials and products in weathertight, climate controlled enclosures, in an environment favourable to the material or product.

.3 For exterior storage of fabricated products, place on sloped supports, above ground.

.4 Remove and replace damaged materials and products at own expense and to the Consultant's satisfaction.

.5 Provide off-site storage and protection when the site does not permit on-site storage or protection, of products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of materials and products.

.6 Store loose granular materials on solid flat surfaces, in a well-drained area. Prevent mixing with foreign matter.

.7 Provide equipment and personnel to store materials and products by methods to prevent soiling, disfigurement, or damage.

.8 Arrange storage of materials and products to permit access for inspection. Periodically inspect to verify materials and products are undamaged and are maintained in acceptable condition.

6 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in the specifications, install or erect materials and products in accordance with the manufacturers' instructions.

.2 Improper installation or erection of materials and products, due to failure in complying with these requirements, authorizes the Construction Manager and/or the Consultant to require removal and re-installation at no increase in the Contract Price.

7 WORKMANSHIP

.1 Workmanship shall be the best quality, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Construction Manager if required Work is such as to make it impractical to produce the required results.

.2 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Consultant whose decision is final.

8 CONCEALMENT

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

9 REMEDIAL WORK

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

.2 Perform remedial work by specialists familiar with the materials affected. Perform work in a manner which will neither damage nor endanger any portion of the Work.

10 FASTENINGS

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

.2 Prevent electrolytic action between dissimilar metals and materials.

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

11 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 the Construction Manager, at no increase in the Contract Price.

12 OVERLOADING

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

13 EXISTING UTILITIES

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

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

14 PRODUCT OPTIONS

.1 Products specified by reference standards or by description only: any product meeting those standards or description.

.2 Products specified by naming one or more manufacturers with substitutions specifically excluded: products of manufacturers named and meeting the specifications; no options or substitutions allowed.

.3 Products specified by naming one or more manufacturers with no specific exclusion of substitutions: submit a request for substitution for any manufacturer not named, in accordance with Section 01 25 00 "Substitutions".

END OF SECTION

1 FIELD ENGINEERING

.1 The Construction Manager will be responsible for all survey and field engineering work required for the project.

.2 The Construction Manager will employ a Registered Ontario Land Surveyor (OLS) to execute the field engineering work.

.3 Survey Reference Points: The OLS will:
- .1 establish two permanent bench marks on site, referenced to established bench marks by survey control points.
- .2 locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction;
- .3 record locations, with horizontal and vertical data in the Project Record Documents;
- .4 make no changes or relocations without prior written notice to the Construction Manager;
- .5 replace control points which are lost, or destroyed or require relocation because of changes in grade;
- .6 establish lines and levels, locate and lay out the work by instrumentation;
- .7 stake for grading, fill and topsoil;
- .8 establish pipe invert elevations;
- .9 stake batter boards for foundations;
- .10 establish foundation; column locations and floor elevations;
- .11 establish lines and levels for mechanical and electrical work;
- .12 maintain a complete, accurate log of control and survey work as it progresses;
- .13 on completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of the work; and
- .14 submit certificate signed by Surveyor certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

.4 The Trade Contractor shall:
- .1 lay out his/her own work relative to the established survey control points and to adjacent work already in place;
- .2 report to the Construction Manager when a reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.

2 DIMENSIONS

.1 Check and verify dimensions wherever referring to the work. Dimensions, when pertaining to the work of another trade, shall be verified with the trade concerned. Details and measurements of work which is to fit or conform with work installed shall be taken at the site.

.2 Do not scale drawings. If there is ambiguity, lack of information or inconsistency, immediately consult the Construction Manager for directions. Be responsible for extra costs caused by the disregarding of this requirement.

3 EXISTING UTILITIES

.1 It is the applicable Trade Contractor's responsibility to obtain all information required for sewer, gas, water, telephone, electrical signal systems, and any other utilities that are within the building and surrounding other locations.

.2 Ensure that piping, sewer lines, conduit, and similar items, belonging to others, are protected during construction activity.

4 EXAMINATION

.1 Examine areas and conditions under which work is to be performed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.

.2 Verify that the existing site conditions and substrate surfaces are acceptable for subsequent work.

.3 Verify that the existing substrate is capable of structural support or attachment of new work being applied.

.4 Verify the specific conditions described in individual specification Sections.

.5 Verify that utility services are available, of the correct characteristics, and in the correct locations.

.6 Do not proceed with the work until unsatisfactory conditions have been corrected to the installer's satisfaction.

.7 Commencement of the installation will be construed as acceptance of the site conditions.

5 PREPARATION

.1 Clean substrate surfaces prior to applying next material or substance.

.2 Allow substrate surfaces to cure or dry out to the moisture content limits recommended by the manufacturer of their material or substance to be applied.

.3 Seal cracks or openings in the substrate prior to applying the next material or substance.

.4 Apply the manufacturer's recommended or required substrate primer, sealer or conditioner prior to applying any new material of substance.

END OF SECTION

1 WORKMANSHIP

.1 Workmanship shall be best quality, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify the Construction Manager if required work is such as to make it impractical to produce the required results.

.2 Do not employ any unfit person or anyone unskilled in his/her required duties.

.3 In cases of dispute, decisions as to quality or fitness of workmanship rest with the Consultant.

2 CONCEALMENT

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

.2 Before installation, inform the Construction Manager if there is a contradictory situation. Install as directed by the Construction Manager.

3 LOCATION OF FIXTURES

.1 The locations of fixtures, apparatus, equipment, fittings, outlets, conduits, pipes and ducts shown or specified, but not dimensioned, shall be considered approximate.

.2 Request clarification from the Consultant, to establish exact locations. Any relocation caused by the Trade Contractor's failure to request clarification shall be done by the Trade Contractor as part of the Work. Where job conditions require reasonable changes in indicated locations and arrangements, make such changes at no additional cost.

.3 Conserve space and coordinate with the work of other trades to ensure that ducts, pipes and conduits will fit into allocated wall and ceiling spaces.

.4 Where ducts, piping and conduits are permitted to be exposed, they shall be neatly and uniformly laid out, parallel to adjacent building lines and parallel to each other where they run in the same direction. Request the Consultant's review of exposed installations prior to the start of work. Where exposed work is not installed in accordance with the Consultant's prior review, make changes to such work, as directed by the Consultant, at no extra cost to the Contract.

.5 Except where locations are specifically noted on the drawings, install exposed mechanical and electrical fixtures, including outlets, switches, thermostats, panels and other items located on walls in an orderly and neatly laid out manner, lining up with each other and grouped together where possible. Request the Consultant's review of the proposed installation prior to the start of rough-in work. Relocate at no extra cost to the Contract any work for which the Consultant's review prior to the start of work was not requested.

4 REMOVED MATERIAL

.1 Unless otherwise specified, materials designated for removal become the Trade Contractor's property and shall be taken from site.

.2 Deposit removed unsalvagable materials in a garbage container daily or more frequently if directed by the Construction Manager.

.3 Locate the garbage container where directed by the Construction Manager.

.4 Arrange for removal of containers immediately as soon as they are full. Legally dispose of content.

5 CONSTRUCTION SAFETY REQUIREMENTS

.1 Execute all work in strict compliance with construction health and safety requirements specified in Section 01 35 29 "Health and Safety Procedures".

6 POWDER ACTUATED FASTENING DEVICES

.1 Do not use powder actuated tools using explosives, unless permitted expressly by the Construction Manager; comply with requirements of CAN3-Z166.2-M85, Use and Handling of Powder Actuated Tools.

7 CUTTING, PATCHING AND MAKING GOOD

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

.2 Inspection:
- .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 shall be construed to mean acceptance of existing conditions.

.3 Execution:
- .1 Perform cutting, fitting, and patching including excavation and fill, as required to complete the Work.
- .2 Remove and replace defective and non- conforming work.
- .3 Provide openings in non-structural elements of the Work for penetrations of mechanical and electrical work.
- .4 Perform work in a manner which will avoid damage to other work.
- .5 Prepare proper surfaces to receive patching and finishing.
- .6 Where possible, employ the original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .7 Cut rigid materials using a power saw or core drill. Pneumatic or impact tools will not be allowed.
- .8 Restore work with new products in accordance with the Contract Documents.
- .9 Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.10 At penetrations of fire-rated wall, ceiling, or floor construction, completely seal voids with fire-rated material, acceptable to the authorities having jurisdiction, full thickness of construction element.

.11 Refinish surfaces to match adjacent finishes; for continuous surfaces refinish to the nearest intersection; for an assembly, refinish the entire unit.

.12 In the finished work there shall be no detectable difference in appearance between existing surfaces, patched surfaces and new surfaces.

8 SLEEVES, HANGERS AND INSERTS

.1 Co-ordinate the setting and packing of sleeves and supply and installation of hangers and inserts. Obtain Consultant's approval before cutting into structure.

END OF SECTION

1 GENERAL

.1 Be responsible for the cleanliness of assigned work areas to the satisfaction of the Construction Manager. Maintain the work areas in a neat and orderly condition at all times.

.2 Periodically, or when directed by the Construction Manager, remove from work areas rubbish and waste materials.

.3 Burning or burying of rubbish and waste materials on site is not permitted.

.4 Use only cleaning materials recommended by the manufacturer of the surface to be cleaned.

.5 Use cleaning material only on surfaces recommended by the cleaning material manufacturer.

2 CLEANING DURING CONSTRUCTION

.1 Keep work areas free from the accumulation of waste products, packaging and debris.

.2 Remove waste material, packaging and debris from the site and deposit in waste container at the end of each working day or more often if required.

.3 Keep dust and dirt to an acceptable level, as directed by the Construction Manager.

.4 Remove oily rags, waste and other hazardous substances from the premises at the end of each working day or more often if required. of waste

.5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal and debris.

.6 Upon verbal or written instruction from the Construction Manager, conduct clean-up as instructed.

3 FINAL CLEANING

.1 Prior to Substantial Performance, remove surplus products, tools, construction machinery and equipment not required for the performance of the remaining Work.

.2 Remove stains, dirt and smudges from finished surfaces.

.3 Clean exposed finished surfaces in accordance with respective material manufacturers' recommendations.

.4 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, 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, and floors and other surfaces.

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

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

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

.9 Broom clean and wash exterior walks, steps and surfaces.

.10 Remove dirt and other disfiguration from exterior surfaces.

.11 Clean and sweep roofs, gutters, areaways, sunken wells.

.12 Sweep and wash clean paved areas.

.13 Clean mechanical and electrical fixtures and other fittings of labels, wrappings, paper and other foreign material.

.14 Replace heating, ventilation and air conditioning filters, if units were operated during construction.

.15 Clean ducts, blowers and coils if heating, ventilation and air conditioning systems were operated without filters during construction.

.16 Clean roofs, downspouts, and drainage systems.

.17 When the Work is Totally Performed, remove surplus products, tools, construction machinery and equipment. Remove waste products and debris.

END OF SECTION

1 GENERAL

.1 The Construction Manager will designate one person as "Waste Management Coordinator (WMC)" to be responsible for implementation of the waste management plan and ensuring compliance by all construction personnel with the requirements of this Section.

.2 Comply with the Environmental Protection Act, Ontario Regulations O. Reg. 102/94 and O. Reg. 103/94 for waste management program on construction and demolition projects.

2 WASTE MANAGEMENT PLAN

.1 The WMC will develop and implement a waste management plan for the project to implement procedures to reduce, reuse and recycle materials to the maximum extent possible.

.2 A copy of the waste management plan will be posted in a conspicuous location where it can be readily seen by all construction personnel.

3 WASTE DISPOSAL

.1 Trade Contractors are required to conform to the waste management plan and implement throughout the project a materials source separation program to collect re-usable and recyclable materials in an orderly fashion for diversion from the general waste stream and alternative disposal at appropriate materials recycling and re-use facilities. The Construction Manager will provide appropriate on-site disposal bins.

.2 Collect and separate packaging for disposal at recycling facilities. Include paper, plastic, polystyrene, corrugated cardboard, metal banding, and other recyclable packaging materials.

4 ENVIRONMENTAL PROTECTION

.1 Dispose of unused adhesive, sealant, volatile materials such as mineral spirits, oil or paint thinner, and other volatile materials which could be hazardous to the health, including empty containers, at an official hazardous materials collection site acceptable to the Consultant, in strict accordance with the requirements of the authorities having jurisdiction and in a manner which will protect construction personnel, visitors to the site, and the public from all such hazards.

.2 Do not permit such materials to enter waterways, storm or sanitary sewers; do not dispose onto ground or other location that might pose a health or environmental hazard. Do not bury or burn rubbish and waste materials on site.

END OF SECTION

1 STARTING SYSTEMS

.1 The Construction Manager will coordinate the schedule for start-up of various equipment and systems.

.2 Notify the Construction Manager four (4) days prior to start-up of each item.

.3 Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

.4 Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

.5 Verify that wiring and support components for equipment are complete and tested.

.6 Execute start-up under the supervision of the applicable manufacturer's representative and Trade Contractors's personnel in accordance with the manufacturer's instructions.

.7 When specified in individual specification Sections, require the manufacturer to provide an authorized representative to be present at the site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise the placing of equipment or the system in operation.

.8 Submit a written report in accordance with Section 01 33 00 "Submittal Procedures", stating that equipment or system has been properly installed and is functioning correctly.

2 DEMONSTRATION AND INSTRUCTIONS

.1 Demonstrate the operation and maintenance of equipment, products and systems to the Owner's personnel two weeks prior to the date of final inspection.

.2 Demonstrate Project equipment and instruct in a classroom environment, by a qualified manufacturers' representative who is knowledgeable about the Project.

.3 For equipment or systems requiring seasonal operation, perform a demonstration for other season within seven (7) months.

.4 Utilize the operation and maintenance manuals as the basis for instruction. Review the contents of the manual with the Owner's personnel, in detail, to explain all aspects of operation and maintenance.

.5 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at an agreed time, at the equipment location.

.6 Prepare and insert additional data in the operations and maintenance manuals when the need for additional data becomes apparent during instruction.

3 TESTING, ADJUSTING, AND BALANCING

.1 The applicable Trade Contractor shall pay for the services of an independent firm, acceptable to the Construction Manager, to perform testing, adjusting, and balancing.

.2 Reports shall be submitted by the independent firm to the Construction Manager indicating observations and results of tests and indicating compliance or non-compliance with the requirements of the Contract Documents.

END OF SECTION

1 INSPECTION AND DECLARATION PROCEDURES

.1 Follow the recommended procedures concerning substantial performance of construction contracts and completion take-over of projects as prescribed in OAA/OGCA Document 100 "Take Over Procedures".

2 REINSPECTION

.1 Should status of the Work require reinspection by The Consultant due to failure of Work to comply with the Contract Documents, the Owner will deduct the costs of reinspection services from payment to the Trade Contractor.

3 FINAL CLEANING

.1 Refer to Section 01 74 13 "Progress and Final Cleaning".

4 ADJUSTING

.1 Adjust operating products and equipment to ensure smooth and unhindered operation.

5 PROJECT CLOSEOUT SUBMITTALS

.1 Prior to application for Certificate of Substantial Performance, submit the documentation applicable to the Trade Contractor's work for incorporation into the following documents, in accordance with the requirements of the Contract Documents. Refer to Section 01 78 00 "Closeout Submittals":
- .1 Project Record Documents.
- .2 Operation and Maintenance Manual.
- .3 Warranties and maintenance service agreements. Refer also to Section 01 78 36 "Warranties".
- .4 Final shop drawings. Refer also to Section 01 33 00 "Submittal Procedures".
- .5 Spare parts and maintenance manuals (were called for in the applicable specification sections).

.2 The Certificate of Substantial Performance will not be issued until the above documents and items have been submitted and are deemed by the Construction Manager to be acceptable.

END OF SECTION

1 MAINTENANCE DATA

.1 Provide operation and maintenance data specified in individual sections of the specifications for inclusion in the operation and maintenance manual to be prepared by the Construction Manager.

.2 Include the requirements of all Sections of the specifications for maintenance instructions.

.3 Coordinate with the Construction Manager and provide the required number of copies in the format prescribed for the manual.

.4 Provide one complete set of final shop drawings indicating corrections and changes made during fabrication and installation.

2 THE TRADE CONTRACTOR'S SUBMITTAL

.1 Each trade Contractor shall submit to the Construction Manager the required documentation as applicable to his/her work for incorporation into the operation and maintenance manual.

.2 Provide three (3) copies of the information and data. Each set shall be organized and presented in accordance with the format prescribed by the Construction Manager.

.3 Neatly type lists and notes. Use clear drawings, diagrams and manufacturers' literature.

.4 Include one complete set of final shop drawings (bound separately) indicating corrections and changes made during fabrication and installation.

3 WARRANTIES

.1 Provide duplicate notarized copies of warranties called for in the applicable specifications Sections.

.2 Refer to individual sections of the specifications for specific requirements of the warranties.

.3 Execute and assemble transferable warranty documents from Subcontractors, Suppliers, and Manufacturers.

.4 Submit warranties immediately after the issuance of the Certificate of Substantial Completion, to facilitate release of holdback monies.

.5 For items of work delayed beyond the date of Substantial Performance of the Work, provide an updated submittal within ten (10) days after acceptance, listing the date of acceptance as the start of the warranty period.

.6 If the validity of an extended warranty is related to proper maintenance and servicing of equipment, etc., provide full details of maintenance requirements.

4 MAINTENANCE SERVICE

.1 Furnish service and maintenance of components indicated in specification sections for the specified time period commencing on the date of Substantial Performance.

.2 Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

.3 Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

.4 Maintenance service shall not be assigned or transferred to any agent or Subcontractor without the Owner's prior written consent.

5 AS-BUILT AND PROJECT RECORD DRAWINGS

.1 The Construction Manager will maintain on site one set of blackline prints for recording as-built conditions.

.2 The Trade Contractor is required to record accurately on the As-Built Drawings significant deviations from the Contract Documents caused by site conditions and changes ordered by the Construction Manager or the Consultant.

.3 Mark changes in red ink.

.4 Where applicable, record the following information:
- .1 Depths of various elements of foundations in relation to finish ground floor.
- .2 Horizontal and vertical locations of underground utilities and appurtenances referenced to a permanent surface improvement.
- .3 Locations of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
- .4 Field changes of dimension and detail.
- .5 Changes made by Change Order, Additional Instruction or order for minor change in the Work.

.5 Each Trade Contractor shall provide the Construction Manager with the as-built information applicable to the work of his/her contract.

6 PROJECT RECORD DRAWINGS

.1 At the completion of the project and prior to final inspection, the Construction Manager will submit the As-Built Drawings to the Consultant and the specialist sub-consultants for the production of Project Record Drawings by revising the electronic drawing files to incorporate the as-built information provided by the various Trade Contractors and the Construction Manager.

.2 The provision of complete information for the production of the Project Record Drawings is the responsibility of each Trade Contractor. The cost of the Consultant's and the specialist sub-consultants' fees for the production of Project Record Drawings based on the Contractor's As-Built Drawings will be paid by the Construction Manager.

7 SPARE PARTS AND MAINTENANCE MATERIALS

.1 Quality:
- .1 Spare parts, maintenance materials and special tools provided shall be new, not damaged or defective, and of the same quality and manufacture as materials and products provided in the Work.
- .2 If requested, furnish evidence as to type, source and quality of products provided.
- .3 Defective materials and products will be rejected, regardless of previous inspections. Replace materials and products at no additional cost to the Contract.

.2 Pay costs of transportation.

.3 Storage, handling and protection:
- .1 Store spare parts, maintenance materials and special tools in a manner which will prevent damage, or deterioration.
- .2 Store in original and undamaged condition with the manufacturer's seals and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at no additional cost to the Contract and to the Construction Manager's and the Consultant's satisfaction.

.4 Spare parts:
- .1 Provide spare parts in quantities specified in the individual specification Sections.
- .2 Provide items of the same manufacture and quality as items in the Work.
- .3 Deliver to the Project Site, place and store where directed by the Construction Manager.
- .4 Receive and catalogue all items. Submit an inventory listing to the Consultant. Include the accepted listings in the Operation and Maintenance Manual specified in Section 01 78 23.
- .5 Obtain receipts for delivered products and submit receipts prior to final payment.

.5 Maintenance materials:
- .1 Provide maintenance and extra materials in quantities specified in individual specification Sections.
- .2 Provide items of same the manufacture and quality as items in the Work.
- .3 Provide materials from the same production run as installed materials.
- .4 Deliver to the Project Site, place and store where directed by the Construction Manager.
- .5 Receive and catalogue all items. Submit an inventory listing to the Construction Manager. Include the approved listings in the Operation and Maintenance Manual.
- .6 Obtain receipts for delivered products and submit receipts prior to final payment.

.6 Special tools:
- .1 Provide special tools in quantities specified in the individual specification Sections.
- .2 Provide items with tags identifying their function and the equipment with which they are associated.
- .3 Deliver to the Project Site, place and store where directed by the Construction Manager.

.4 Receive and catalogue all items. Include the accepted listings in the Operation and Maintenance Manual.

END OF SECTION

1 SUMMARY

.1 This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

.1 Refer to the General Conditions for terms of the Trade Contractor's period for correction of the Work.

.2 Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and Subcontractors required to countersign special warranties with the Trade Contractor.

.3 Separate Trade Contracts: Each Trade Contractor is responsible for warranties related to his/her own Contract.

2 WARRANTY REQUIREMENTS

.1 Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

.2 Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original and shall commence on the date of completion and acceptance of the corrective work.

.3 Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Trade Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

.4 Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

.1 Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

.5 Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

3 SUBMITTALS

.1 Submit written warranties to the Consultant prior to the date certified for Substantial Performance. If the Consultant's Certificate of Substantial Performance designates a commencement date for warranties other than the date of Substantial Performance for the Work, or a designated portion of the Work, submit written warranties upon request of the Consultant.

- .1 When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Consultant within 15 days of completion of that designated portion of the Work.
- .2 For items of work delayed beyond the date of Substantial Performance of the Work, provide an updated submittal within ten (10) days after acceptance, listing the date of acceptance as the start of the warranty period.

.2 When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Consultant, for approval prior to final execution.

- .1 Refer to Divisions 02 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.

.3 Form of Submittal: At Final Completion compile 2 copies of each required warranty properly executed by the Trade Contractors, Subcontractor, Supplier, or manufacturer and assembled by the Construction Manager. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

- .1 Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 216 mm x 281 mm paper.
- .2 Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
- .3 Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.

.4 If the validity of an extended warranty is related to proper maintenance and servicing of equipment, etc., provide full details of maintenance requirements.

.5 When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

END OF SECTION

1 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate operation and maintenance of equipment and systems to the Owner's personnel two weeks prior to date of interim completion.

.2 The Construction Manager will provide a list of personnel to receive instructions, and coordinate their attendance at agreed-upon times.

.3 Preparation:
- .1 Verify conditions for demonstration and instructions comply with requirements.
- .2 Verify designated personnel are present.
- .3 Ensure equipment has been inspected and put into operation in accordance with the requirements of the respective specification sections.
- .4 Ensure testing, adjusting, and balancing has been performed and equipment and systems are fully operational.

.4 Demonstration and Instructions:
- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the equipment location.
- .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
- .3 Review contents of manual in detail to explain aspects of operation and maintenance.
- .4 Prepare and insert additional data in operation and maintenance manuals when needed during instructions.
- .5 Perform training as required to fully inform the Owner's persdonnel regarding the correct operation and maintenance of each item of equipment.

2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit schedule of the time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for the Construction Manager's approval.

.2 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

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

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

3 QUALITY ASSURANCE

.1 When specified in individual Sections and/or when necessary for the proper and complete training of the Owner's personnel, arrange with the manufacturer to provide an authorized representative to demonstrate operation of equipment and systems:
- .1 Instruct the Owner's personnel.
- .2 Provide written report that demonstration and instructions have been completed.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to apply a liquid densifier and sealer to the warehouse concrete floor, as indicated on the drawings, as specified herein and as required for a complete project.

1.3 REFERENCES

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

.2 Canadian Standards Association (CSA):
- .1 CSA A23.1:19\A23.2:19, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS):
- .1 Material Safety Data Sheets (MSDS).

1.4 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Product Data:
- .1 Provide manufacturer's printed product literature and data sheets for concrete finishes and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Include application instructions for the densifier/sealer.
- .3 Include manufacturer's material safety data sheets for the safe handling of the specified materials and products, in accordance with Workplace Hazardous Materials Information Service (WHMIS) requirements.

.3 Quality Assurance/Control Submittals:
- .1 Certificates: Manufacturer's certificate that products meet or exceed specified requirements.
- .2 If requested by the Consultant, submit laboratory test reports certifying compliance with specification requirements.
- .3 Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

.4 Maintenance Data: Provide maintenance data for the concrete floors for incorporation into the operation and maintenance manual specified in Section 01 78 00 "Closeout Submittals".

1.5 QUALIFICATIONS

.1 The products specified in this Section shall be manufactured by a company with minimum 10 years experience in the actual production of the specified products.

.2 The work of this Section shall be executed by a company licensed by the material manufacturer as an approved applicator.

.3 Employ only skilled tradespersons who are experienced in this work.

.4 If requested by the Consultant, provide evidence of previously completed projects of a similar nature.

1.6 QUALITY ASSURANCE

.1 Installation shall be directly and personally supervised by a technical representative of the material manufacturer, throughout the period of the installation.

1.7 FIELD SAMPLES AND MOCK-UPS

.1 Construct a minimum 10 m^2 mock-up of the densifier/sealer applied to a concrete floor surface for the Consultant's review.

.2 Locate where directed by the Consultant.

.3 Repair or replace unacceptable mock-ups at no cost to Owner.

.4 The accepted mock-up may be incorporated into the finished work.

.5 The accepted mock-up will be the standard of acceptance for the work of this Section.

1.8 PREINSTALLATION CONFERENCE

.1 A preinstallation conference will be held the day before installation starts, with the following present:

.1 Consultant
.2 Manufacturer's technical representative
.3 Contractor
.4 Installer
.5 Other trade contractors whose work affects or is affected by the work of this Section.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Deliver products in original unopened packaging with legible manufacturer's identification.

.2 Store materials in strict accordance with Section 01 60 00 "Product Requirements" and the manufacturer's recommendations.

1.10 SITE CONDITIONS

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

.2 Electrical power: Provide sufficient electrical power to operate equipment normally used during construction

.3 Work area: Make work area watertight protected against rain and detrimental weather conditions.

.4 Temperature: Maintain minimum 10°C ambient temperature for 7 days before installation and minimum 48 hours after completion of the work and maintain relative humidity maximum 40% during the same period.

.5 Moisture: Ensure the concrete substrate is within the moisture limits prescribed by the densifier/sealer manufacturer.

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

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials, including packaging materials, generated by the work of this Section in accordance with the Waste Management Plan.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on products manufactured by The Euclid Chemical Co.

.2 Requests for substitutions will be considered in accordance with the provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

.3 Provide liquid densifier sealer and related concrete treatment and admixture products from a single qualified manufacturer.

2.2 LIQUID FLOOR TREATMENT

.1 Liquid Densifier Sealer: High performance, deeply penetrating concrete densifier; odourless, colourless, VOC - compliant, non-yellowing silicate and siliconate based solution designed to harden, dustproof and protect concrete floors and to resist black rubber tire marks. The compound must contain a minimum solids content of 20% of which 50% is siliconate.

.1 Standard of acceptance: Euco Diamond Hard by The Euclid Chemical Co.

Part 3 Execution

3.1 EXAMINATION

.1 Examine areas and conditions under which work is to be performed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.

.2 Verify slab surfaces are ready to receive the work as recommended by the manufacturer's written instructions.

.3 Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.

.4 Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Trade Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 PREPARATION

.1 Prepare concrete surfaces in accordance with the manufacturer's written instructions.
- .1 Ensure surfaces are clean, dry and free of standing water.
- .2 Remove dirt, dust, oil, grease, sealers, and other materials that may prevent penetration liquid densifier sealer.

3.3 APPLICATION

.1 Apply Liquid Densifier Sealer in strict accordance with the manufacturer's instructions.

.2 Spray, squeegee or roll on liquid to clean, dry concrete surface at a rate no greater than 2.6L per $10m^2$.

.3 Scrub the liquid into the surface with a mechanical scrubber.

.4 Keep the surface wet for a minimum of 30 minutes with the liquid densifier/sealer during the application process.

.5 When the product thickens, but not more than 60 minutes after initial application, squeegee or vacuum the surface to remove all excess liquid.
- .1 Do not leave any residue on surface.
- .2 Do not track material onto untreated surfaces.

3.4 PROTECTION

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

3.5 CLEANING

.1 Upon completion of the installation remove from the premises all surplus material, dirt and debris caused by the work of this Section and leave the installation clean.

.2 Clean any drippage and spills of surplus liquids from adjacent surfaces.

.3 Make good damage to other work caused by the work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to provide a polished concrete floor finish, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 07 92 00 - Joint Sealants.

1.3 REFERENCES

.1 American Concrete Institute (ACI):
- .1 ACI 302.1R-15, Guide to Concrete Floor and Slab Construction.

.2 American National Standards Institute (ANSI):
- .1 ANSI/NFSI B101.1-2020, Measuring the Wet SCOF of Walkways.

.3 American Society for Testing and Materials (ASTM):
- .1 ASTM C309-19, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .2 ASTM C171-20, Standard Specification for Sheet Materials for Curing Concrete.
- .3 ASTM C779/C779M-19, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.

.4 Reunion Internationale des Laboratoires D'Essais et de Recherches sur les Materiaux et les Constructions (RILEM):
- .1 Rilem Test Method 11.4 - Standard Measurement of Reduction of Moisture Penetration through Horizontal Concrete Surfaces.

.5 National Floor Safety Institute (NFSI):
- .1 NFSI Test Method 101-A - Standard for Evaluating High-Traction Flooring Materials.

1.4 SYSTEM DESCRIPTION

.1 Performance Requirements: Provide polished flooring that has been designed, manufactured and installed to achieve the following:
- .1 Abrasion Resistance (ASTM C779, Method A, high resistance): No more than 0.20 mm wear in 30 minutes.
- .2 Reflectivity (determined by a standard gloss meter): 35% increase.
- .3 Waterproof Properties (Rilem Test Method 11.4): 70% or greater reduction in absorption.

.4 High Traction Rating: NFSI 101-A, ANSI B-101.1 non-slip properties.

.2 Design Requirements: Coordinate with the concrete trade contractor to ensure that the concrete floor slab meets or exceeds the following minimum properties:
- .1 Hardened concrete properties:
  - .1 Minimum concrete compressive strength: 24 MPa.
  - .2 Normal weight concrete - no lightweight aggregate.
  - .3 Non-air entrained.
- .2 Placement Properties:
  - .1 Natural concrete slump of 114 to 127 mm. Admixtures may be used.
  - .2 Flatness Requirements:
    - .1 Overall FF 50.
    - .2 Local FF 40.
- .3 Hard-steel trowelled (3 passes) concrete - no burnishing marks. Finish to ACI 302.1R, Class 5 floor.
- .4 Curing Options:
  - .1 Membrane forming curing compounds (ASTM C309, Type 1, Class B, all resin, dissipating cure); acrylic curing and sealing compounds not recommended.
  - .2 Sheet membrane (ASTM C171); polyethylene film not recommended.
  - .3 Damp Curing: Seven-day cure.

1.5 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Shop Drawings: Indicate information on shop drawings as follows:
- .1 Typical layout including dimensions and floor grinding schedule.
- .2 Plan view of floor and joint pattern layout.
- .3 Hardener, sealer, densifier identified in notes.

.3 Product Data: Submit product data, including manufacturer's product data sheets, for specified products.
- .1 Include manufacturer's material safety data sheets for the safe handling of the specified materials and products, in accordance with Workplace Hazardous Materials Information Service (WHMIS) requirements.
- .2 Include preparation and concrete grinding procedures.

.4 Quality Assurance Submittals:
- .1 Test Reports: Certified test reports showing compliance with specified requirements, including performance characteristics and physical properties.
- .2 Certificates:
  - .1 Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
  - .2 Letter of certification from the National Floor Safety Institute confirming the system has been tested and passed phase Two Level of certification when tested by Method 101-A. ANSI B-101.1 2009 non-slip properties.

.3 Current Trade Contractor's certificate, signed by the manufacturer, declaring the Trade Contractor as an approved applicator of the polishing system.

.3 Manufacturer's Instructions: Manufacturer's installation instructions.

.5 Warranty: Submit a copy of the specified warranty documents.

.6 Operation and Maintenance Data: Submit operation and maintenance data for installed products for inclusion in the operation and maintenance manual specified in Section 01 78 00 "Closeout Submittals". Include:

.1 Manufacturer's instructions on maintenance renewal of applied treatments.

.2 Protocols and product specifications for joint filing, crack repair and/or surface repair.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications:

.1 The manufacturer shall be capable of providing field service representation during construction and approving the application method.

.2 The manufacturer shall have a minimum 5 years of experience in manufacturing system components similar to or exceeding requirements of project.

.3 Obtain all components from a single manufacturer.

.2 Concrete finishing components and materials shall be from single manufacturer.

.3 Applicator Qualifications:

.1 The work of this Section shall be executed by a company licensed by the product manufacturer as an approved applicator and with a minimum of 5 years documented successful experience in applications similar in type and scope to that required for this project.

.2 Employ only skilled tradesmen who have successfully completed a course of instruction provided by the material manufacturer and are experienced in this work.

.3 If requested by the Consultant, provide evidence of previously completed projects of a similar nature.

.4 Regulatory Requirements: Comply with NFSI Test Method 101-A Phase Two Level High Traction Material.

.5 Mock-Ups:

.1 Construct a 10 m^2 sample panel at the jobsite at a location as directed by the Construction Manager, under conditions similar to those which will exist during the actual application.

.2 The mock-up will be used to judge workmanship, concrete substrate preparation, operation of equipment, material application, and shine.

.3 Allow 24 hours for inspection of the mock-up before proceeding with work.

.4 When accepted, the mock-up will demonstrate the minimum standard of quality required for this work.

.5 Allow for at least 3 mock-ups to obtain the Consultant's acceptance.

.6 The mock-up may not remain as part of finished work. Remove the mock-up and dispose of materials when no longer required and when directed by the Construction Manager.

.7 The mock-up will demonstrate the following characteristics of the finished installation
- .1 Required level of cut: Level 2 - Salt/Pepper Finish: Expose the fine aggregate such as sand and small aggregate with the concrete. The depth of grind will depend greatly on the placement and finishing procedures. Generally, this level of cut can be achieved within 1.6 mm of the surface.
- .2 Sheen Level A: Sheen (glossy) as determined by a gloss reading of 45 - 60 to be obtained immediately after polishing and before application of protective coating enhancers or resin transfer from resin bound abrasives.

.6 Pre-installation meetings:
- .1 Conduct a pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements, with the following present:
  - .1 Construction Manager
  - .2 Consultant
  - .3 Concrete trade contractor
  - .4 Trade Contractor (applicator)
  - .5 Manufacturer's technical representative
  - .6 Other trade contractors affected by the work
- .2 Review the following:
  - .1 Environmental requirements.
  - .2 Scheduling and phasing of the work.
  - .3 Coordinating with other work and personnel. Remind all trade contractors that they are working on a surface that is to become a finished surface.
  - .4 Protection of adjacent surfaces.
  - .5 Surface preparation.
  - .6 Repair of defects and defective work prior to installation.
  - .7 Cleaning.
  - .8 Application of polished floor finishes.
  - .9 Application of liquid hardener, densifier.
  - .10 Protection of finished surfaces after installation.
  - .11 Placing of materials on the concrete surface that may cause staining, etching or scratching

1.7 DELIVERY, STORAGE AND HANDLING

.1 Ordering: Comply with the manufacturer's ordering instructions and lead time requirements to avoid construction delays.

.2 Delivery: Deliver materials in manufacturer's original packaging with identification labels and seals intact.

.3 Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by the manufacturer.

1.8 PROJECT CONDITIONS

.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by the manufacturer for optimum results. Do not install products under environmental conditions outside the manufacturer's recommended limits.

.2 Protection of Concrete Slab:
- .1 Protect from petroleum stains during construction.
- .2 Diaper hydraulic power equipment.
- .3 Restrict vehicular parking.
- .4 Restrict use of pipe cutting machinery.
- .5 Restrict placement of reinforcing steel on the slab.
- .6 Restrict use of acids or acidic detergents on the slab.

1.9 PROJECT AMBIENT CONDITIONS

.1 Installation Location: Comply with the manufacturer's written recommendations.

1.10 SEQUENCING

.1 Sequence with other work: Comply with the manufacturer's written recommendations for sequencing construction operations.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials, including packaging materials, generated by the work of this Section in accordance with the Waste Management Plan.

1.12 WARRANTY

.1 Manufacturer's Warranty: Submit, for the Owner's acceptance, a manufacturer's standard warranty document executed by an authorized company official. The Manufacturer's warranty is in addition to, and does not limit, other rights the Owner may have under the Contract Documents.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on products manufactured by L & M Construction Chemicals Inc.

.2 Requests for substitutions will be considered in accordance with the provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

.3 Obtain all components of the stained and polished floor system from a single manufacturer.

2.2 POLISHED CONCRETE

.1 Products/Systems:
- .1 Hardener, Sealer, Densifier: Proprietary, water-based, odourless liquid, VOC compliant, environmentally safe, chemical hardening solution leaving no surface film. Standard of acceptance:
  - .1 FGS Hardener Plus by L & M.
  - .2 Lion Hard by L & M may be substituted where disposal of rinse water is in conflict with the requirements of the authorities having jurisdiction.
- .2 Joint Filler: Semi-rigid, 2-component, self-levelling, 100% solids, rapid curing, polyurea control joint and crack filler with Shore A 80 or higher hardness. Standard of acceptance: Joint Tite 750 by L & M.
- .3 Oil-Repellent Sealer: Ready to use, silane, siloxane and fluoropolymers blended water-based solution sealer, quick drying, low-odour, oil and water repellent, VOC compliant and compatible with chemically hardened floors. Standard of acceptance: Petrotex by L & M.
- .4 Cleaning Solution: Proprietary, mild, highly concentrated liquid concrete cleaner and conditioner containing wetting and emulsifying agents; biodegradable, environmentally safe and certified High Traction by National Floor Safety Institute (NFSI). Standard of acceptance: FGS Concrete Conditioner by L & M.
- .5 Stain Guard Sealer: Ready to use, low odour, VOC compliant, topical sealer consisting of low molecular emulsified cross-linking, coupling polymers that effectively protect concrete floor surfaces from staining, defacing and deterioration due to contaminant penetration. Standard of acceptance: Permaguard SPS by L & M.

2.3 FINISH GLOSS LEVEL

.1 Finish: Medium gloss (MG-2), 800 grit.

Part 3 Execution

3.1 EXAMINATION

.1 Examine areas and conditions under which work is to be performed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.

.2 Verify that concrete substrate conditions are acceptable for product application in accordance with the manufacturer's instructions prior to application of concrete finishing materials.

.3 Verify Concrete Slab Performance Requirements. Coordinate with Section 03 30 00 "Cast-in-Place Concrete:
- .1 Verify concrete is cured to 28 day duration and has minimum 24 MPa strength.
- .2 Verify concrete surfaces have received a hard steel-trowel finish (3 passes) during placement.
- .3 Verify overall floor flatness is a minimum of F_f 40.

.4 Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.

.5 Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Trade Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 PREPARATION

.1 Ensure surfaces are clean and free of dirt and other foreign matter harmful to the performance of concrete finishing materials.

.2 Examine the surface to determine soundness of the concrete for polishing.

3.3 INSTALLATION

.1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions.

.2 Floor Surface Polishing and Treatment:
- .1 Provide polished concrete floor treatment to the entire surface of floor slabs where indicated on the drawings. Provide a consistent finish in all contiguous areas.
- .2 Apply the floor finish prior to the installation of fixtures and accessories.
- .3 Diamond-polish concrete floor surfaces with a power disc machine recommended by the floor finish manufacturer. Sequence with coarse to fine grit. The applicator to determine the optimum starting grit in order to achieve the specified aggregate exposure.
  - .1 Use the manufacturer's recommended polishing grits for each sequence to achieve the desired finish level.
  - .2 Following the initial passes of metal bond diamonds, drop back a minimum of one grit level when transitioning to resin bond diamonds.
  - .3 The separation in grit designation shall be a minimum of 50 for the transitioning step.
  - .4 Refine each abrasive grit to its fullest potential before moving on to the next level.
  - .5 Thoroughly scrub the floor between each grit pass to remove all loose material.
- .4 The finished floor shall match that of the reviewed and accepted mock-up for the level of sheen and the degree of aggregate exposed in the concrete surface.
- .5 All concrete surfaces shall be as uniform in appearance as possible.

.3 Polishing Concrete: Polish concrete to the 400 grit level.

.4 Hardener and Densifier Application:
- .1 First coat: If FGS Hardener Plus is used, apply at the rate of 6.25 m^2/L, following the 400 grit level or, if Lion Hard is used, apply at the rate of at 10 to 15 m^2/L.
- .2 Second coat: If FGS Hardener Plus is used, apply at the rate of 8.75 m^2/L, prior to the final polishing pass or, if Lion Hard is used apply at the rate of 15 to 20 m^2/L.
- .3 Follow manufacturer's recommendations for drying time between successive coats.
- .4 Remove defects and re-polish defective areas.
- .5 Finish lines at edges of floor finish adjoining other materials in a clean and sharp manner.

3.4 ADJUSTMENTS

.1 Make good surfaces not matching the reviewed and accepted mock-up.

.2 Re-polish and make good those areas as necessary, to the approval of the Consultant.

3.5 FINAL CLEANING

.1 Upon completion, remove surplus and excess materials, rubbish, tools and equipment.

.2 Clean any drippage and spills of dye from adjacent surfaces.

.3 Make good any damage to other work caused by the work of this Section.

3.6 PROTECTION

.1 Protect the concrete flooring from damage during construction in accordance with the manufacturer's recommendations.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to fabricate and install hollow steel doors and frames, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 07 21 20 - Urethane Foam Insulating Sealant.
- .2 Section 07 27 16 - Vapour Permeable Air/Moisture Barrier
- .3 Section 07 92 00 - Joint Sealants.
- .4 Section 08 80 00 - Glazing.
- .5 Section 09 21 16 - Gypsum Board Assemblies.
- .6 Section 09 22 16 - Non-Structural Metal Steel Stud Framing.
- .7 Section 09 91 00 - Painting.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM A653/A653M-20, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB 1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA):
- .1 CSA W59-18, Welded Steel Construction.

.4 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA):
- .1 CSDFMA Specifications for Commercial Steel Doors and Frames.

.5 Door and Hardware Institute (DHI):
- .1 ANSI/DHI A115 IG-1994, Installation Guide for Doors and Hardware.

.6 Master Painters Institute (MPI):
- .1 MPI Architectural Specification Manual, 2018, including revisions 2019 (referred to herein as "MPI Manual")
- .2 MPI Approved Product List, (referred to herein as "MPI APL").

.7 National Fire Protection Association (NFPA):
- .1 NFPA 80-2018, Standard for Fire Doors and Other Opening Protectives.
- .2 NFPA 252-2016, Standard Methods of Fire Tests of Door Assemblies.

.8 Underwriters' Laboratories of Canada (ULC):
- .1 CAN/ULC S104-15, Standard Method for Fire Tests of Door Assemblies.
- .2 CAN/ULC-S105:2016, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC S104.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

.1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN/ULC S104 and CAN/ULC-S105 for ratings specified or indicated.

.2 The work of this Section shall conform to OBC requirements, NFPA 80, and all other applicable codes and regulations, to the satisfaction of the authorities having jurisdiction.

1.5 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Shop Drawings:
- .1 Indicate each type of door, size, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, glazed openings, arrangement of hardware and fire rating where applicable.
- .2 Indicate each type frame, elevation, profile, material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and finishes.
- .3 Include a schedule which identifies each unit, with door marks and numbers which clearly correspond to the room numbering system used on the architectural drawings.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Protect products during fabrication, transportation, site storage and erection.

.2 Store products in strict accordance with the manufacturer's recommendations.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials, including packaging materials, generated by the work of this Section in accordance with the Waste Management Plan.

Part 2 Products

2.1 STEEL

.1 Steel: Commercial grade steel to ASTM A653/A653M, wipe coat galvanized steel, coating designation ZF001 (A01), minimum base steel thickness unless noted otherwise:
- .1 Frames: 1.6 mm (16 ga).

.2 Door faces:
  .1 Exterior doors: 1.6 mm (16 ga).
  .2 Interior doors: 1.2 mm (18 ga).
.3 Top and bottom end channels: 1.2 mm (18 ga).
.4 Reinforcements:
  .1 Lock and strike reinforcements: 1.6 mm (16 ga).
  .2 Hinge reinforcements: 3.4 mm (10 ga).
  .3 Flush bolt reinforcements: 1.6 mm (16 ga).
  .4 Door closer and holder reinforcements: 2.7 mm (12 ga).

2.2 ACCESSORIES

.1 Anchors: as required to suit each specific condition.

.2 Touch-up primer for galvanized steel sheet: Inorganic zinc-rich primer to MPI APL #19.

.3 Door silencers: Single stud rubber/neoprene type, 3 per door.

.4 Other components: Provide other door and frame components in accordance with CSDFMA requirements.

2.3 FABRICATION

.1 Fabricate doors and frames as detailed, to Canadian Steel Door and Frame Manufacturers' Association, (CSDFMA) Canadian Manufacturing Specifications for Steel Doors and Frames, except where specified otherwise. Reinforce door and frames to suit hardware requirements.

.2 Blank, reinforce, drill and tap doors and frames for mortised hardware. Reinforce doors and frames for surface mounted hardware.

.3 Specified reinforcement is the minimum requirement. Provide additional reinforcement where required to ensure a permanent, rigid, trouble-free installation able to withstand the stresses of heavy usage.

.4 Cut, shear, straighten and work the steel in a manner which will prevent disfigurement of the finished work.

.5 Punch frames for rubber door bumpers.

.6 Fill seams and joints and weld depressions with epoxy metal filler, disk-sand to a smooth, flat, uniform, scratch-free surface, with all arrases sharp and true-to-line. Ream drilled and punched holes and remove all burrs.

.7 Finished work shall be free of warp, open seams, buckles, weld and grind marks and other surface defects detrimental to the production of a good paint finish.

.8 Conceal all fastenings except those required for loose glazing stops.

.9 Welding shall conform to CSA W59.

2.4 FABRICATION OF DOORS

.1 Doors shall be swing-type, flush, with provision for glass and/or louvre openings as indicated.

.2 Exterior and interior doors and transom panels to be hollow steel construction.
- .1 Faces: Form each face sheet for exterior and interior doors from a single steel sheet.
- .2 Reinforce exterior doors with vertical stiffeners, securely welded to each face sheet at 150 mm on centre maximum.
  - .1 Fill voids between stiffeners with expanded polyurethane insulation.
- .3 Construct interior doors with a honeycomb core.

.3 Make provision for glazing as indicated and provide the following:
- .1 Channel formed glazing stop, 16 mm high.
- .2 Screw fixing with countersunk oval head sheet metal screws.

.4 Make cut-outs to receive louvres.

.5 Longitudinal edges shall be welded. Top and bottom shall be closed with recessed spot welded channel closures. Grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.

.6 All exterior doors and also interior doors with electronic contacts shall have a top flush steel closure with edges welded and seam filled.

.7 Bevel the opening edge of the door to provide clearance for a tighter fit in frame.

.8 Provide reinforcement and drill holes in the locations and diameters required in accordance with hardware requirements and templates. Refer to Section 08 71 10 "Door Hardware".

.9 Provide fire labelled doors where indicated in the Door Schedule. Fire rated doors shall be tested in strict conformance with CAN/ULC S104 or NFPA 252 and listed by an agency acceptable to the authorities having jurisdiction. Construct doors as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by the listing agency to individual manufacturers.

.10 Attach ULC labels to doors where applicable.

.11 Touch up galvanized finish damaged during fabrication with zinc-rich primer and leave all surfaces ready to receive paint finish by Section 09 91 00.

.12 Shop-prime exterior doors with cementitious primer with cementitious galvanized metal primer to MPI APL #26.

2.5 FABRICATION OF FRAMES: GENERAL

.1 Frames to be manufactured by the same manufacturer as doors.

.2 Frames in public areas and suite entrance door frames to be continuously welded construction. Spot welded or knockdown frames are acceptable only within suites.

.3 Exterior frames shall be thermally broken with minimum 6 mm neoprene spacer mechanically interlocked with the inner and outer portions of the frames to form a single rigid assembly.

.4 Cut mitres and joints accurately and weld continuously on inside of profile. Accurately cope and securely weld butt joints of mullions, transom bars, centre rails and sills.

.5 Grind welded joints to a flat plane, fill with metallic paste filler and sand to uniform smooth finish.

.6 Conceal fastenings except where exposed fastenings are indicated.

.7 Blank, mortise, reinforce, drill and tap frames and reinforcements to receive hardware using templates provided by finish hardware supplier. Refer to Section 08 71 10 "Door Hardware.

.8 Protect mortise cutouts with steel guard boxes.

.9 Protect strike and hinge reinforcements using guard boxes welded to frames.

.10 Reinforce head of frames wider than 1200 mm (4'-0").

.11 Securely attach floor anchors to the inside of each jamb profile.

.12 Weld in two temporary jamb spreaders per frame to maintain proper alignment during shipment.

.13 Provide for appropriate anchorage to floor and wall construction. Locate each wall anchor 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 anchors, and an additional anchor for each additional 760 mm of height or fraction thereof, except as indicated below.

.14 For frames in previously placed concrete, provide anchors located not more than 150 mm from the top and bottom of each jamb, and intermediate anchors at 660 mm on centre maximum.

.15 Provide single stud rubber door silencers. Install three on strike jamb for each single door and two at head for each pair of doors.

.16 Provide fire labelled frames where indicated in the Door Schedule. Fire rated frames shall be tested in strict conformance with CAN/ULC S104 or NFPA 252 and listed by an agency acceptable to the authorities having jurisdiction. Construct frames as detailed in Follow-Up Service Procedures/ Factory Inspection Manuals issued by the listing agency to individual manufacturers.

.17 Attach ULC or Warnock Hersey labels to frames, where applicable.

.18 When required due to site access or due to shipping limitations, frames for large openings may be fabricated in sections with splice joints for field assembly. Show the locations of field joints on the shop drawings and adhere to those locations.

.19 Touch up galvanized finish damaged during fabrication with zinc-rich primer to CAN/CGSB 1.181 and leave all surfaces ready to receive paint finish by Section 09 91 00.

.20 Shop-prime exterior frames with cementitious primer to MPI APL #26, single-component organic zinc-rich primer.

Part 3 Execution

3.1 INSTALLATION GENERAL

.1 Install doors, frames and hardware in accordance with ANSI/DHI A115 IG.

.2 Install labelled doors, frames and hardware in accordance with NFPA 80.

3.2 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation and secure anchorages and connections to adjacent construction.

.2 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.

.3 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.4 Grout exterior frames solid on the exterior side and fill on the interior side with insulation.

.5 Refer to Section 07 92 00 "Joint Sealants" for application of sealant around the exterior and interior perimeter of the frames.

.6 For glazing refer to Section 08 80 00 "Glazing".

3.3 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 10 "Door Hardware".

.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
- .1 Hinge side: 1.0 mm.
- .2 Latchside and head: 1.5 mm.
- .3 Finished floor and thresholds:
  - .1 Generally: 13 mm.
  - .2 Doors identified as undercut: 25 mm.

.3 Adjust operable parts for smooth, correct function.

.4 For glazing refer to Section 08 80 00 "Glazing".

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to fabricate and install glazed aluminum doors and frames, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Single source responsibility: Engage a single manufacturer to assume undivided responsibility for the work of this section and the glazed aluminum curtain wall specified in Section 08 44 13.

.3 Related Sections:
- .1 Section 07 21 20 - Urethane Foam Insulating Sealant.
- .2 Section 07 27 16 - Vapour Permeable Air/Moisture Barrier.
- .3 Section 07 92 00 - Joint Sealants.
- .4 Section 08 44 13 - Glazed Aluminum Curtain Wall.
- .5 Section 08 80 00 - Glazing.

1.3 REFERENCES

.1 American Architectural Manufacturers Association (AAMA):
- .1 AAMA 1503-09, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- .2 AAMA 2603-20, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
- .3 AAMA 2605-20, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

.2 American Society for Testing and Materials (ASTM):
- .1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM E283/E283M-19, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- .3 ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .4 ASTM E331-00(2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference.

.3 Canadian Standards Association: (CSA):
- .1 CSA G40.20-13/G40.21-13(2018),General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA S157-17/S157.1-17, Strength Design in Aluminum / Commentary on CSA S157-17, Strength Design in Aluminum.

.4 The Society for Protective Coatings (SSPC):
- .1 SSPC-Paint 12 1982, Paint Specification No. 12: Cold Applied Asphalt Mastic (Extra Thick Film).

1.4 REGULATORY REQUIREMENTS

.1 The work of this Section shall conform to OBC requirements and all other applicable codes and regulations, to the satisfaction of the authorities having jurisdiction.

1.5 DESIGN CRITERIA AND PERFORMANCE

.1 Design frames and doors in exterior walls to accommodate expansion and contraction within an ambient temperature range of -35°C to +35°C.

.2 Structural performance shall be based on CSA S157 and a maximum deflection of 1/175 of the span.

.3 Air infiltration for exterior doors and frames shall not exceed 2.78 m^3/h.m for a single door or 5.56 m^3/h.m for a pair of double doors, when tested in accordance with ASTM E283 at a pressure differential of 75 Pa.

.4 Thermally, the grid members of exterior frames shall have a condensation resistance equal to, or better than, the area along the bottom of a 25 mm sealed glass unit with standard metal spacer edge construction.

1.6 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Shop Drawings:
- .1 Indicate each type of door and frame, extrusion profiles, method of assembly, section and hardware reinforcement, locations of exposed fasteners, finishes and location of manufacturer's nameplates.
- .2 Submit catalogue details for each type of door and frame illustrating profiles, dimensions and methods of assembly.
- .3 Coordinate with other Sections and ensure that shop drawings are submitted early enough in the schedule to permit review prior to the work of any trade required to build in items for this Section. For example: inserts or weld plates, for anchorage, required to be built into cast-in-place concrete work.

.3 Maintenance Data: Provide maintenance data for cleaning and maintenance of aluminum finishes for incorporation into the operation and maintenance manual specified in Section 01 78 00 "Closeout Submittals".

1.7 PROTECTION

.1 Apply temporary protective coating to finished surfaces. Remove coating after erection. Do not use coatings that will become hard to remove or leave residue.

.2 Leave protective covering in place until final cleaning of building.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials, including packaging materials, generated by the work of this Section in accordance with the Waste Management Plan.

1.9 WARRANTY

.1 For the work of this Section, the 12-months warranty period prescribed in the General Conditions of the Contract, is extended to 5 years.

Part 2 Products

2.1 GENERAL

.1 This specification is based on aluminum doors and frames as manufactured by Kawneer Company Canada Limited.

.2 Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

2.2 MATERIALS

.1 Aluminum extrusions: Aluminum Association alloy AA6063-T5 anodizing quality.

.2 Sheet aluminum: Aluminum Association alloy AA1100-H14 anodizing quality.

.3 Steel reinforcement, fastening clips, etc.: to CSA G40.21, hot dip galvanized to ASTM A123.

.4 Fasteners: 300 Series stainless steel or 400 Series cadmium plated stainless steel of sufficient size and quantity to perform their intended function, finished to match adjacent material.

.5 Weatherstrip: replaceable mohair metal backed wool pile.

.6 Door bumpers: black neoprene.

.7 Threshold: Aluminum extrusion, 12.7 mm high x extended width to cover top of foundation wall x length to suit. Aluminum Association alloy AA6063-T5, mill finish. Provide cadmium plated steel fasteners as required.

.8 Door bottom seal: Adjustable door seal of anodized extruded aluminum frame and vinyl weather seal, recessed in door bottom, closed ends.

.9 Isolation coating: Alkali resistant bituminous paint to SSPC Paint-12 applied at rate of 1 l/m^2.

.10 Glass and glazing materials: Provided by this Section in accordance with Section 08 80 00 "Glazing".

.11 Sealants: Refer to Section 07 92 00 "Joint Sealants".

.12 Door hardware: Refer to Section 08 71 10 "Door Hardware".

2.3 FRAMED ALUMINUM DOORS

.1 Framed aluminum doors for public areas:
- .1 Exterior: Kawneer Medium Stile Insulclad 360 Series, thermally broken.
- .2 Interior: Kawneer Medium Stile 350 Series
- .3 Stile and rail dimensions, exclusive of glazing stops, to be as follows:
  - .1 Door stiles nominal 89 mm wide.
  - .2 Top rail nominal 89 mm wide.
  - .3 Bottom rail nominal 165 mm wide.
  - .4 Thickness:
    - .1 Exterior: 57 mm.
    - .2 Interior: 45 mm.

.2 Construction:
- .1 Construct doors of porthole extrusions with minimum wall thickness of 3 mm.
- .2 Reinforce mechanically-joined corners of doors to produce sturdy door unit.
- .3 Glazing stops: interlocking snap-in type for dry glazing.
- .4 Exterior stops: tamperproof type.

2.4 ALUMINUM FRAMES

.1 Exterior aluminum frames: Curtain wall framing as specified in Section 08 44 13 "Glazed Aluminum Curtain Wall".

.2 Interior aluminum frames: Tri-Fab 451 Series, flush glazed.
- .1 Frames shall be box-sections without thermal break, of aluminum extrusions with minimum wall thickness of 3 mm.
- .2 Frame members to be 51 mm wide x 114 mm deep.

2.5 FINISHES

.1 Aluminum surfaces:
- .1 Finish exterior aluminum surfaces with superior performing organic coating to AAMA 2605. Colour: Black.
- .2 Finish interior aluminum surfaces with organic coating to AAMA 2603. Colour: White.
- .3 Prior to application of finish:
  - .1 Notching and welding to be completely executed.
  - .2 Exposed surfaces to be fine satin finished to ensure elimination of extrusion die marks and fabrication marks and to ensure uniformity of finish.

.2 Steel clips and reinforcement: 380 g/m^2 zinc coating to ASTM A123.

.3 Isolate aluminum from the following components by a heavy coating of bituminous coating:
- .1 Dissimilar metals except stainless steel, zinc or white bronze in small area.
- .2 Concrete, mortar and masonry.
- .3 Wood.

2.6 FABRICATION

.1 Doors and framing to be by same manufacturer.

.2 Fabricate doors and frames to profiles and maximum face sizes as shown. Provide minimum 22 mm bite for insulating glazed units.

.3 Provide structural steel reinforcement as required.

.4 Fit joints tightly and secure mechanically.

.5 Conceal fastenings.

.6 Design anchorages so that they do not interfere with other work such as floor finishes of drywall finishes to walls.

.7 Mortise, reinforce, drill and tap doors, frames and reinforcements to receive hardware using templates provided by Section 08 71 10 "Door Hardware".

.8 Coordinate installation of hardware in the doors and frames to ensure proper operation of the completed installation.

.9 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry.

Part 3 Execution

3.1 EXAMINATION

.1 Examine areas and conditions under which work is to be performed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.

.2 Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.

.3 Take field measurements to verify or supplement dimensions.

.4 Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Trade Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 INSTALLATION

.1 Set frames plumb, square, level at correct elevation in alignment with adjacent work.

.2 Anchor securely.

.3 Brace frames rigidly for building-in. Install temporary horizontal wood spreaders at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders and supports after frames are built-in.

.4 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.

.5 Adjust operable parts for correct function.

.6 Make allowances for deflection of structure to ensure that structural loads are not transmitted to frames.

3.3 GLAZING

.1 Glaze aluminum doors and frames in accordance with Section 08 80 00 "Glazing" and the manufacturer's standard glazing methods and materials.

3.4 AIR/VAPOUR SEAL

.1 Ensure airtight connections with adjacent construction to maintain the airseal over the entire building envelope.

.2 Coordinate with the building air/vapour barrier installer and install air/vapour barrier transition strips at the interface with adjacent construction. Refer to details.

.3 Inspect the entire assembly for gaps in the air seal and make good.

3.5 CAULKING

.1 Seal joints to provide weathertight seal at outside and air, vapour seal at inside.

.2 Apply sealant in accordance with Section 07 92 00 "Joint Sealants". Conceal sealant within the aluminum work except where exposed use is permitted by the Consultant. Colour of exposed sealant to match finish to the approval of the Consultant.

3.6 PROTECTION

.1 During and after installation, protect the work of this Section from damage. Remove all corrosive or foreign material or droppings resulting from the work of this or other trades.

.2 Do not use coatings that will become hard to remove or leave residue.

3.7 FINAL CLEANING

.1 Remove protective coating and clean all surfaces, using materials and methods recommended by the door and frame manufacturer.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included:
- .1 The work of this Section includes the provision of all labour, materials, equipment and services required to fabricate and install insulated sectional metal overhead doors, as indicated on the drawings, as specified herein and as required for a complete project.
- .2 Provide a power-operated door, c/w all wiring and electrical connections from the electrical power supply disconnect.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM A653/A653M-20, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A924/A924M-20, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .3 ASTM E283/E283M-19, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.2 Canadian Standards Association (CSA):
- .1 CSA-C22.1-18, Canadian Electrical Code, Part I, Safety Standard for Electrical Installations (24th Edition). Includes Errata (2018).

.3 Door and Access Systems Manufacturers Association (DASMA):
- .1 ANSI/DASMA 102-2018, Specifications for Sectional Overhead Type Doors.

1.4 DESIGN CRITERIA

.1 The door and hardware system shall conform to ANSI/DASMA 102.

.2 Design exterior door assemblies to withstand windload of 1 kPa with a maximum horizontal deflection of 1/240 of opening width.

.3 Design door assemblies to withstand minimum 100,000 cycles.

.4 The doors shall have a thermal resistance factor of RSI 2.8. (k = 0.357 W/m^2K).

1.5 QUALIFICATIONS

.1 The work of this Section shall be fabricated by a manufacturer with minimum five years experience in the actual production of the specified products.

.2 The installation shall be executed by a company approved by the overhead door manufacturer as an installer, using skilled tradesmen experienced in this work.

1.6 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Shop Drawings: Clearly indicate pertinent dimensions, materials, operating mechanisms, required clearances, anchorage methods, hardware locations, weatherstripping, electrical connections, and installation details.

.3 Samples: If requested by the Construction Manager or the Consultant submit samples of door section construction, showing joints, weatherstripping etc.

.4 Product Data:
- .1 Provide product data for the overhead door and hardware installation.
- .2 Include general construction, component connections and details, and electrical equipment, operation instructions and information.

.5 Manufacturer's Installation Instructions:
- .1 Indicate installation sequence and procedures, adjustment, and alignment procedures.
- .2 Include installation instructions for the entire system including doors, hardware, controls and motors.

.6 Maintenance Data:
- .1 Provide maintenance data for the overhead door and hardware installation for incorporation into the operation and maintenance manual specified in Section 01 78 00 "Closeout Submittals".
- .2 Include a scheduled maintenance program to include lubrication requirements and frequency, periodic adjustments required, scheduled maintenance suggested, manufacturer's data sheets, and equipment inter-connection diagrams.

1.7 REGULATORY REQUIREMENTS

.1 Electrical components shall be CSA-approved and installation shall conform to CSA-C22.1.

1.8 QUALITY ASSURANCE

.1 Manufacturer Qualifications:
- .1 The work of this Section shall be fabricated by a manufacturer with minimum five years experience in the actual production of similar products to those required for this project.

.2 The specific door model used must have a proven track record of successful installations in similar applications of no less than 3 years. References to be provided upon request.

.2 Installer Qualifications: The work of this Section shall be executed by a company licensed by the door manufacturer as an approved installer.

.3 If requested by the Consultant, provide evidence of previously completed projects of a similar nature.

1.9 COORDINATION

.1 Coordinate the work with the electrical trade contractor with respect to the installation of electric power supply and locations and sizes of conduit.

1.10 PROTECTION

.1 Apply temporary protective coating to finished surfaces. Do not use coatings that will become difficult to remove or leave residue.

.2 Leave protective coating in place until final cleaning of building. Remove coating at that time.

1.11 STORAGE AND HANDLING

.1 Store and handle materials in strict accordance with the manufacturer's recommendations.

1.12 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

Part 2 Materials

2.1 MANUFACTURERS

.1 This specification is based on insulated sectional metal overhead doors by Garaga Inc.

.2 Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

2.2 MATERIALS

.1 Steel sheet:
.1 Galvanized steel sheet to ASTM A653, 0.46 mm (26 ga) thick, Z180 zinc coating, exterior and interior.

.2 Surface embossed with woodgrain texture and horizontal grooves.
.3 Polyester paint finish, 2 coats ASTM A924 00.25 mm. Colour to be selected from the manufacturer's standard colour range.

.2 Insulation: CFC-free, polyurethane foam injected under high pressure between the walls of each section.
.1 Density is 40.4 kg/m^3
.2 Thermal resistance: RSI 1.6 per 25 mm of thickness, Total: RSI 2.8 (k = 0.357 W/m^2K).

.3 Reinforcement plates: Steel reinforcement plates, minimum 1.8 mm (14 ga), inserted within the door sections to provide proper fastening for the hinges and plates for an electric garage door operator with central trolley.

.4 Section ends: Grade 4 dry pine, guaranteed against cracking and rot, inserted at both ends of each door section for attachment of the lateral hinges and a thermal break.

.5 Assembly joints: Assemble the galvanized steel sheets of each door section with mechanically-embedded, triple-contact, weatherstripping. Standard of acceptance: Interlok™.

2.3 OVERHEAD DOORS

.1 Type: Garaga Model G-5000, grooved.

.2 Door Sections: Fabricated by a continuous formed-in-place polyurethane lamination process, resulting in a metal-foam-metal sandwich with a rigid polyurethane foam core, thermally broken. Thickness: 45 mm.

.3 Factory-installed panoramic windows:
.1 Insulated double glazing units with 3 mm clear tempered glass inner and outer panes:
.1 Airspace: 16 mm.
.2 Total thickness: 22 mm.
.3 Perimeter seal in stainless steel extrusions. Standard of acceptance: Intercept™ system.
.2 Window frame: Aluminum tubular extrusions with rigid PVC mouldings.
.3 Windows to be factory-installed.

2.4 WEATHERSTRIPPING

.1 Bottom weatherstripping: Continuous weatherstripping made of a U-shaped PVC extrusion and semi-circular TPE (thermoplastic elastomer) tubing.

.2 Weatherstripping between sections: Triple-contact inset weatherstripping of flexible and rigid PVC, at the intersection of each section.
.1 When tested to ASTM E283 at a pressure of 0.075 kPa (equivalent to 40 km/h winds), the air infiltration not exceed 0.033 l/sec/m of joint.
.2 Standard of acceptance: Interlok™ system.

.3 Perimeter weatherstripping: weatherstripping made up of an aluminum extrusion and a double-edged strip of arctic vinyl, installed on the exterior side of the door jambs and lintel.

2.5 HARDWARE

.1 Tracks: 2.6 mm (12 ga) galvanized steel, 76 mm wide.
- .1 Reinforce the horizontal track with a 50 x 50 mm steel angle.
- .2 Include 3.04 mm (11 ga) thick, continuous track angles and ancillary hardware items.

.2 Hinges: 2.3 mm (13 ga) galvanized steel; 76 mm dia. industrial rollers with 10 ball bearings.

.3 Struts: 0.76 mm (22 ga) galvanized steel horizontal struts and 2.3 mm (13 ga) double hinges at each end.

.4 Type of movement: Configure the movement of the hardware to allow for the most space possible available underneath the door when it is in the open position.

.5 Springs: Torsion spring lifting system including drums, galvanized cables, springs, anchor plates, and a 25 mm solid steel shaft.

.6 Track guards: Protect the vertical tracks by 1524 mm long track guards to avoid accidental breaking.
- .1 Paint track guards with a yellow after installation.

.7 Pusher springs: Provide pusher springs at the end of the horizontal tracks in order to prevent the cables from falling off the drums.

.8 "C" bumper springs: Equip the vertical lift movement hardware with "C" bumper springs at the end of the horizontal tracks.

.9 Flanged bearing: Equip the end bearing plates with flanged bearings and centre plate (football bearings).

2.6 OPERATION

.1 Electrically operated with jack shaft drive:
- .1 The electric motors, control mechanisms, relays, and electrical devices of the operator shall be CSA and ULC approved.
- .2 Push-button controls (up/stop/down) located on an inside wall where directed.
- .3 Manual chain hoist override, c/w a quick release mechanism and reduction gear to require a maximum pull-force of 16 kg to operate door in the event of power failure.
- .4 Coordinate the electrical power supply with the electrical trade contractor.
- .5 Equip the operators with a reversible motor with a built-in thermal protection mechanism.
- .6 The electrical control circuit shall be of 24 volts.

.2 The door shall travel at approximately 200 to 280 mm/sec.

.3 Include a photoelectric cell activated system which keeps the door from closing if an object is in the door opening and a soft-touch pressure-sensitive bottom edge which returns the door to an open position if it contacts any object during its closing cycle.

2.7 FABRICATION

.1 Prior to fabrication take field measurements to verify or supplement dimensions and record on shop drawings.

Part 3 Execution

3.1 COORDINATION WITH OTHER TRADES

.1 Coordinate with other trades to ensure that required work by others is properly and completely executed. Claims for extras for failure of any trade to provide all work necessary for a complete sectional overhead door installation will not be considered.

.2 Coordinate with the metal fabrications trade contractor and provide drawings and/or templates as required to ensure that openings are properly prepared, including door frames, frame extensions and mounting plates to receive torsion spring assembly and electric operators.

.3 Coordinate power supply and electrical hook-up with the electrical trade contractor.

3.2 EXAMINATION

.1 Examine areas and conditions under which work is to be performed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.

.2 Verify that opening sizes, tolerances, and conditions are acceptable.

.3 Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.

.4 Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Trade Contractor shall be fully responsible for satisfactory work as specified herein.

3.3 INSTALLATION

.1 Install doors and hardware in accordance with the manufacturer's instructions and the reviewed shop drawings.

.2 Install level, plumb and in true alignment.

.3 Use anchorage devices to securely fasten assembly to adjacent construction and building framing without distortion or stress.

.4 Install wiring and make electrical connections to the disconnect provided by the electrical trade contractor. Test electrical circuits for correct operation.
   .1 Employ qualified licensed electricians for all electrical work.
   .2 Execute electrical work in compliance with CSA C22.1.

.5 Touch-up with zinc rich primer where galvanized finish damaged during fabrication.

.6 Protect exposed finishes from damage. Leave protective material in place until immediately prior to handing over to the Owner.

3.4 ADJUSTMENT

.1 Adjust door and operating assemblies.

.2 Test and adjust doors for correct, smooth function.

.3 Adjust weatherstripping to form a weathertight seal.

.4 Touch up and repair damaged installed products to the satisfaction of the Consultant. Replace products that cannot be satisfactorily repaired.

3.5 CLEANING

.1 Upon completion of the installation remove from the premises all surplus material, dirt and debris caused by the work of this Section and leave the installation clean.

.2 Clean the door and components. Remove protective coverings.

.3 Make good any damage caused by the work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to engineer, fabricate and install glazed aluminum curtain wall, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Single source responsibility: Engage a single manufacturer to assume undivided responsibility for the work of this section and the aluminum doors and frames specified in Section 08 11 16.

.3 Related Work:
- .1 Section 08 11 16 - Aluminum Doors and Frames.
- .2 Section 08 80 00 - Glazing.

1.3 REFERENCES

.1 Aluminum Association (AA):
- .1 Aluminum Standards and Data, Metric SI, 2009.
- .2 AA-DAF-45-2003(R2009), Designation System for Aluminum Finishes, Ninth Edition.

.2 American Architectural Manufacturers Association (AAMA):
- .1 AAMA 501-15, Methods of Test for Exterior Walls.
- .2 AAMA 501.1-17, Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.
- .3 AAMA 501.4-18, Recommended Static Test Method for Evaluating Window Wall, Curtain Wall and Storefront Systems Subjected to Vertical Inter-Story Movements.
- .4 AAMA 501.6-18, Recommended Dynamic Test method for Determining the Seismic Drift Causing Glass Fallout from Window Wall, Curtain Wall and Storefront Systems.
- .5 AAMA 503-14, Voluntary Specification for Field Testing of Metal Storefronts, Curtain Walls and Sloped Glazing Systems.
- .6 AAMA 1503-09, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- .7 AAMA 2603-20, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
- .8 AAMA 2605-20, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

.3 American Society for Testing and Materials (ASTM):
- .1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
.3 ASTM C864-05(2015), Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks and Spacers.
.4 ASTM E90-09(2016), Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
.5 ASTM E283/E283M-19, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
.6 ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
.7 ASTM E331-00(2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference.
.8 ASTM E783-02(2018), Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
.9 ASTM E1105-15, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference.
.10 ASTM E1425-14, Standard Practice for Determining the Acoustical Performance of Exterior Windows and Doors.

.4 Canadian General Standards Board (CGSB):
.1 CAN/CGSB-19.13-M87, Sealing Compound, One-Component, Elastomeric, Chemical Curing.

.5 Canadian Standards Association (CSA):
.1 CSA-G40.20-13/G40.21-13(2018),General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA-S157-17/S157.1-17, Strength Design in Aluminum / Commentary on CSA S157-17, Strength Design in Aluminum.

.6 Master Painters Institute (MPI):
.1 MPI Architectural Specification Manual, 2018 (referred to herein as "MPI Manual")
.2 MPI Approved Product List (referred to herein as "MPI APL").

.7 The Society for Protective Coatings (SSPC):
.1 SSPC-Paint 12 1982, Paint Specification No. 12: Cold Applied Asphalt Mastic (Extra Thick Film).

1.4 REGULATORY REQUIREMENTS

.1 The work of this Section shall conform to OBC requirements, and all other applicable codes and regulations, to the satisfaction of the authorities having jurisdiction.

1.5 QUALIFICATIONS

.1 Manufacturer:
.1 The work of this Section shall be engineered and fabricated by a manufacturer with minimum ten years experience in the actual production of products similar to the specified products.

.2 The manufacturer shall be capable of providing structural calculations, applicable independent product test reports, installation instructions, a review of the application method, customer approval and periodic field service representation during construction.

.3 The components of the curtain wall system shall be factory fabricated by the framing supplier, fully engineered and delivered knockdown. Windows shall be delivered pre-assembled.

.2 Installer: The work of this Section shall be installed by a firm experienced to perform work of this Section who has specialized in the installation of work similar to that required for this project and who is acceptable to the product manufacturer.

.3 If requested by the Consultant, provide evidence of previously completed projects of a similar nature.

.4 Employ only skilled tradesmen, experienced in this work.

1.6 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Shop Drawings:

.1 Clearly indicate materials and large scale details for head, jamb, sill, transoms and mullions, profiles of components, elevations of units, anchorage details, location of isolation coating, description of related components and exposed finishes and fasteners, pressure equalization holes, methods of avoiding thermal bridging, maintenance of integrity of insulation and thermal break between subframe and structure, prevention of air infiltration, maintenance of the integrity of the air barrier, condensation control, caulking.

.2 Shop drawings shall be prepared by a structural engineer licensed to practice in Ontario.

.1 Each shop drawing submitted shall bear the stamp and signature of the aforesaid structural engineer.

.2 After installation, provide written certification, signed by the structural engineer responsible for the shop drawings, that all items have been installed in accordance with the shop drawings.

.3 Submit catalogue details for curtain wall illustrating profiles, dimensions and methods of assembly.

.4 Coordinate with other Sections and ensure that shop drawings are submitted early enough in the schedule to permit review prior to the work of any trade required to build in items for this Section. For example: inserts or weld plates, for anchorage, required to be built into cast-in-place concrete work.

.3 Test Reports: Submit certified test reports by an independent testing agency showing compliance with specified performance characteristics.

.4 Maintenance Data:

.1 Provide maintenance data for cleaning and maintenance of aluminum finishes for incorporation into the operation and maintenance manual specified in Section 01 78 00 "Closeout Submittals".

1.7 DESIGN CRITERIA AND PERFORMANCE

.1 The drawings indicate the architectural intent only. The engineering design of the installation, including design of anchorages, fastenings, connections and reinforcement, is the responsibility of the curtain wall fabricator in association with the structural engineer responsible for the shop drawings.

.2 Structural performance shall be based on CAN3-S157 and a maximum deflection of 1/175 of the span.

.3 Windloads to be based on climatic data for the location of the site in accordance with OBC.

.4 Air infiltration shall not exceed 0.03 L/s-m^2 when tested in accordance with ASTM E283 at a pressure differential of 300 Pa.

.5 Water resistance (static): The test specimen shall be tested in accordance with ASTM E331. There shall be no leakage at a static air pressure differential of 575 Pa as defined in AAMA 501.

.6 Water Resistance (dynamic): The test specimen shall be tested in accordance with AAMA 501.1. There shall be no leakage at an air pressure differential of 575 Pa as defined in AAMA 501.

.7 Uniform load: A static air design load of 1915 Pa shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member at design load. At structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

.8 Seismic: When tested to AAMA 501.4, the system must meet a design displacement of 0.010 x the storey height and ultimate displacement of 1.5 x the design displacement.

.9 Thermal Transmittance (U-factor): When tested to AAMA 1503, the thermal transmittance (U-factor) shall not be more than: 0.66 BThU/hr/ft^2/^{o}F. in accordance with AAMA 507.

.10 Condensation Index (I): when tested to CSA-A440, the Condensation Index shall not be less than 68_{frame} and 54_{glass}.

.11 Sound Transmission Loss: When tested to ASTM E90 and ASTM E1425, the Sound Transmission Class (STC) and Outdoor/Indoor Transmission Class (OITC) shall not be less than STC 31 or OITC 26.

1.8 THERMAL MOVEMENT

.1 Determine the full range of temperature conditions to which the glazing will be subjected after installation.

.2 Coordinate frame and glass dimensions with Section 08 80 00 "Glazing" to ensure that adequate provision is made to permit sealed thermal units to expand and contract without breakage

.3 Immediately replace sealed thermal units which crack or break as a result stresses caused by thermal movement due to temperature change, at no cost to the Owner.

1.9 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling, and unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

.2 Storage and protection: Store materials protected from exposure to harmful weather conditions. Handle material and components to avoid damage. Protect curtain wall material against damage from elements, construction activities, and other hazards before, during and after curtain wall installation.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials, including packaging materials, generated by the work of this Section in accordance with the Waste Management Plan.

1.11 WARRANTY

.1 For the work of this Section, the 12-months warranty prescribed in the General Conditions of the Contract is extended to 10 years.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on 1602 Series curtain wall by Kawneer Co. of Canada Ltd.

.2 Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

2.2 MATERIALS

.1 Aluminum extrusions:
- .1 Material: To ASTM B221, 6063-T6 alloy and temper.
- .2 Member wall thickness: Sufficient to meet the specified structural requirements.
- .3 Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of curtain wall members are nominal. Comply with AA Aluminum Standards and Data.

2.3 ACCESSORIES

.1 Fasteners: Fasteners in contact with aluminum to be stainless steel 300 Series or stainless steel 400 Series.

.2 Gaskets: Glazing gaskets shall comply with ASTM C864 and be extruded of a silicone compatible EPDM rubber that provides for silicone adhesion.

.3 Perimeter Anchors: Aluminum, or galvanized steel.
- .1 Steel anchors: hot dipped galvanized with 380 g/m^2 zinc coating to ASTM A123.
- .2 When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

.4 Exterior sills: Aluminum extrusions to profile as detailed and to suit job conditions; minimum 3 mm thick, complete with concealed anchoring devices. Profile to be heavy enough to withstand service loadings without deformation. Finish aluminum after fabrication to match curtain wall framing.

.5 Zinc-rich coating: MPI APL #18.

.6 Isolation coating: alkali resistant bituminous paint to SSPC Paint-12.

2.4 RELATED MATERIALS

.1 Glass: Sealed double glazing units in accordance with Section 08 80 00 "Glazing".

.2 Air barrier transition membrane: Refer to Section 07 27 16 "Vapour Permeable Air/Moisture Barrier".

.3 Sealants: Refer to Section 07 92 00 "Joint Sealants".

2.5 SPANDREL PANELS

.1 Metal back pan:
- .1 0.91 mm (20 a) sheet steel liner with sealed corners, 100 mm deep, hot dipped galvanized to ASTM A123 with 458 g/m^2 coating.
- .2 Insulation: 100 mm semi-rigid mineral wool fibre insulation board made from basalt rock and steel slag, conforming to ASTM C612. Density 56 kg/m^3. Standard of acceptance: Rockwool CurtainRock.

.2 Spandrel infill:
- .1 Glass: Refer to Section 08 80 00 "Glazing".

2.6 FABRICATION

.1 Fabricate components in accordance with manufacturer's installation instructions and with minimum clearances and shim spacing around the perimeter of the assembly, yet enabling installation and dynamic movement of the perimeter seal.

.2 Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.

.3 Prepare components to receive anchor devices. Fabricate anchors.

.4 Arrange fasteners and attachments to conceal from view and so that they do not interfere with other work, such as floor finishes or drywall finishes to walls.

.5 Mullions to be tubular extruded members, square-cut, corner bracket construction with butyl tape joint seals.

.6 Provide structural steel reinforcement for strength, stiffness and connections as required.

.7 Frame sections to incorporate integral screw ports for mechanical fastening of all corners and intermediate joints with self-tapping screws or spigots. No exposed fastening devices will be permitted.

.8 Make provision for door and hardware installation where indicated. Coordinate with Section 08 11 16 "Aluminum Doors and Frames".

.9 Factory-install rigid polystyrene insulation in all tubular framing members.

.10 Provide expansion and construction joints as required.

.11 Touch-up galvanized steel brackets with zinc-rich coating immediately following the alignment and fastening operation.

.12 Design framing members to drain moisture to the exterior.

.13 Fabricate curtain wall and screens square and true with maximum tolerance of plus or minus 1.5 mm for glazing units with diagonal measurement of 1.8 m or less and plus or minus 3 mm for units with diagonal measurement over 1.8 m.

.14 Make allowance for deflection of structure. Ensure that structural loads are not transmitted to glazing units.

2.7 FINISHES

.1 Aluminum surfaces:
- .1 Finish exterior aluminum surfaces with superior performing organic coating to AAMA 2605. Colour: Black.
- .2 Finish interior aluminum surfaces with organic coating to AAMA 2603. Colour: White.
- .3 Prior to application of finish:
  - .1 Notching and welding to be completely executed.
  - .2 Exposed surfaces to be fine satin finished to ensure elimination of extrusion die marks and fabrication marks and to ensure uniformity of finish.

.2 Steel clips and reinforcement: 380 g/m^2 zinc coating to ASTM A123.

.3 Isolate aluminum from the following components by a heavy coating of bituminous coating:
- .1 Dissimilar metals except stainless steel, zinc or white bronze in small area.
- .2 Concrete, mortar and masonry.
- .3 Wood.

Part 3 Execution

3.1 EXAMINATION

.1 Examine areas and conditions under which work is to be performed and notify the Consultant in writing of conditions detrimental to the proper and timely completion of the work.

.2 Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions.

.3 Verify openings are sized to receive curtain wall system and sill plate is level in accordance with manufacturer's acceptable tolerances.

.4 Field Measurements:
- .1 Verify actual measurements/openings by field measurements before fabrication.
- .2 Show recorded measurements on shop drawings.
- .3 Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

.5 Do not proceed with the installation until unsatisfactory conditions have been corrected to the satisfaction of the installer.

.6 Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 ANCHORAGE INSERTS

.1 Coordinate with the concrete installer and ensure that inserts for anchorage which are required to be installed by those Sections are supplied by this Section at the appropriate time in the construction schedule.

3.3 CURTAIN WALL INSTALLATION

.1 Install curtain wall systems in accordance with the reviewed and accepted shop drawings and the manufacturer's instructions.

.2 Install plumb, level, and true to line, without warp or rack of frames with manufacturer's prescribed tolerances.

.3 Provide support and anchor in place.

.4 Attach vertical mullions to structure. Provide sliding connections as necessary to prevent structural loads from being transmitted to the curtain wall.

.5 Arrange components to prevent a perceptible variation in colour.

.6 Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.

.7 Glazing: Glass shall be outside glazed and held in place with extruded aluminum pressure plates anchored to the mullion using stainless steel fasteners spaced no greater than 9" on centre.

.8 Water Drainage: Each light of glass shall be compartmentalized using joint plugs and silicone sealant to divert water to the horizontal weep locations. Weep holes shall be located in the horizontal pressure plates and covers to divert water to the exterior of the building.

3.4 AIR/VAPOUR, INSULATION AND INSULATING SEAL

.1 Ensure complete air/vapour barrier continuity within the curtain wall assembly and at the interface between the curtain wall assembly and adjacent construction. Incorporate membrane air barrier transition strips as specified in Section 07 27 16 "Vapour Permeable Air/Moisture Barrier."

.2 Coordinate with Section 07 21 00 and fill voids with insulation as indicated. Where voids cannot be filled with specified batt or board insulation, inject urethane foam insulating sealant as specified in Section 07 21 20.

3.5 CAULKING

.1 Seal the perimeter of the curtain wall framing against adjacent materials, on the interior and exterior.

.2 Apply sealant in accordance with Section 07 92 00 "Joint Sealants". Conceal sealant within framing except where exposed use is permitted by the Consultant. Colour of exposed sealant to match finish, to the approval of the Consultant.

3.6 FIELD QUALITY CONTROL

.1 Field Tests:
- .1 The Consultant will select curtain wall units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured.
- .2 Conduct tests for air infiltration and water penetration with the manufacturer's representative present.
- .3 Tests not meeting specified performance requirements and units having deficiencies shall be corrected at no additional cost to the Contract.

.2 Testing: Testing shall be performed in accordance with AAMA 503 by a qualified independent testing agency acceptable to the Consultant. The cost of initial inspection and testing will be paid by the Owner. The cost of re-inspection and retesting required as a result of failure to meet specification requirements on the initial inspection/test shall be paid by the Contractor.
- .1 Air Infiltration Tests: Conduct tests in accordance with ASTM E783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.45 $L/s/m^2$, which ever is greater.
- .2 Water Infiltration Tests: Conduct tests in accordance with ASTM E1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 383 Pa.

.3 Manufacturer's Field Services: Upon the Consultant's written request, provide periodic site visits by the manufacturer's field service representative.

3.7 PROTECTION AND CLEANING

.1 During and after installation, protect the work of this Section from damage. Protect aluminum curtain wall system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

.2 Remove all corrosive or foreign material or droppings resulting from the work of this or other trades.

.3 Touch up and repair damaged installed products to the satisfaction of the Consultant. Replace products that cannot be satisfactorily repaired.

.4 Make good damage to other work caused by the work of this Section.

.5 Clean installed products in accordance with manufacturer's instructions prior Substantial Performance of the Contract.

.6 Remove construction debris from project site and legally dispose of debris.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to fabricate and install aluminum windows, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 08 11 16 - Aluminum Doors and Frames.
- .2 Section 08 44 13 - Glazed Aluminum Cur4twqai Wall.
- .3 Section 08 80 00 - Glazing.

1.3 REFERENCES

.1 Aluminum Association (AA):
- .1 AA-DAF-45-2003(R2009), Designation System for Aluminum Finishes, Ninth Edition.

.2 American Architectural Manufacturers Association (AAMA):
- .1 AAMA 1503-09, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- .2 AAMA 2603-15, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
- .3 AAMA 2605-20, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

.3 Canadian Standards Association (CSA):
- .1 CSA A440-17, North American Fenestration Standard/Specification for Windows, Doors and Skylights.
- .2 CSA G40.20-13/G40.21-13(2018),General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .3 CSA-S157-17/S157.1-17, Strength Design in Aluminum / Commentary on CSA S157-17, Strength Design in Aluminum.

.4 Master Painters Institute (MPI):
- .1 MPI Architectural Specification Manual, 2018 (referred to herein as "MPI Manual")
- .2 MPI Approved Product List (referred to herein as "MPI APL").

.5 The Society for Protective Coatings (SSPC):
- .1 SSPC-Paint 12 1982, Paint Specification No. 12: Cold Applied Asphalt Mastic (Extra Thick Film).

1.4 QUALIFICATIONS

.1 The work of this Section shall be fabricated in the factory by a manufacturer with minimum 10 years experience in the actual production of the specified products and shipped to the site, k/d.

.2 The work of this Section shall be installed by a company licensed by the material manufacturer as an approved installer.

.3 Employ only skilled tradesmen who are experienced in this work.

.4 If requested by the Construction Manager or the Consultant, provide evidence of previously completed projects of a similar nature.

1.5 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Shop Drawings:
- .1 Indicate materials and fully dimensioned details at a scale of no less than half full size for head, jamb and sill, profiles of components, interior and exterior trim, junction between combination units, fully dimensioned elevations of units, anchorage details, locations of isolation coating, description of related components and exposed finishes fasteners, and caulking. Indicate the locations of manufacturer's nameplates.
- .2 Provide complete fabrication and installation details of custom exterior trim at window heads.

.3 Test Reports: Submit test reports from independent testing laboratories, acceptable to the Consultant, certifying compliance with the specification requirements for:
- .1 Finish.
- .2 Air tightness.
- .3 Water tightness.
- .4 Wind load resistance, mullion deflection.
- .5 Condensation resistance.

.4 Samples:
- .1 Submit a sample of a each type of window, reduced overall size but using actual sections, components and glass in specified finishes. Include a cutaway corner of each type of window.
- .2 Samples to incorporate an representative example of each typical connection and each trim profile.
- .3 Submit a full-size sample of a 300 mm long section of the exterior trim at the window heads. Include method of fastening and end caps. Use actual materials and finishes proposed for the work.

.5 Post-installation certification: After installation, provide written certification, signed by the window manufacturer, that all items have been installed in accordance with the reviewed shop drawings to the satisfaction of the window manufacturer.

.6 Maintenance Data:
- .1 Provide maintenance data for incorporation into the operation and maintenance manual specified in Section 01 78 00 "Closeout Submittals".
- .2 Include maintenance data for cleaning and maintenance of aluminum finishes.
- .3 Provide the Owner's personnel with a demonstration of cleaning, re-glazing and general maintenance procedures.

1.6 PERFORMANCE CRITERIA

.1 Structural performance shall be based on CSA-S157 and a maximum deflection of 1/175 of the span.

.2 Windows shall meet or exceed the following performance classification requirements of CSA Standard AAMA/WDMA/101/I.S.2/CSA-A440 Windows:
- .1 Air infiltration:
  - .1 Fixed windows: FIXED
  - .2 Operable vents: A3
- .2 Water infiltration: B7
- .3 Wind load resistance: C5
- .4 Condensation resistance temperature index:
  - .1 Fixed windows:
    - .1 I_f: 66
    - .2 I_g: 68
  - .2 Operable vents: 56.2 minimum.

.3 The design shall allow for an ambient temperature range of -35°C to +35°C without causing buckling, stresses on glass, failure of seals, undue stress on structural elements, reduction of performance or other detrimental effects.

1.7 THERMAL MOVEMENT

.1 Conduct a thermal analysis to determine the full range of shadow patterns and temperature conditions to which the glazing will be subjected after installation.

.2 Coordinate frame and glass dimensions to ensure that adequate provision is made to provide for thermal movement of the glass.

.3 Sealed thermal units which crack or break as a result of thermal stresses will be replaced, immediately, at no cost to the Owner.

1.8 PROTECTION

.1 Apply temporary protective coating to finished surfaces. Remove coating after erection. Do not use coatings that will become hard to remove or leave residue.

.2 Leave protective covering in place until final cleaning of building.

1.9 STORAGE AND HANDLING

.1 Store and handle materials in strict accordance with the manufacturer's recommendations.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

1.11 WARRANTY

.1 For the work of this Section, the 12-months warranty period prescribed in the General Conditions of the Contract, is extended to 10 years.

Part 2 Products

2.1 GENERAL

.1 This specification is based on aluminum windows as manufactured by Kawneer Company Canada Ltd.

.2 Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

2.2 PRODUCTS

.1 Windows: Kawneer 518 Series with 526 Series operable casements.

2.3 MATERIALS

.1 Extrusions shall be 6063 T54 alloy and temper, thermally broken, minimum wall thickness 3 mm Main frame members to be 102 mm deep.

.2 Formed aluminum components shall be of alloy and temper suitable for their purpose and finish.

.3 Thermal Break separator: Extruded rigid virgin polyvinyl chloride, interlocked between inner and outer frames.

.4 Aluminum sheet: Aluminum Association 5005-H34 alloy and temper:
- .1 Exposed to sight: Anodizing quality.
- .2 Not exposed to sight: Utility grade.

.5 Fasteners shall be 300 series stainless steel or 400 series stainless steel cadmium plated and of sufficient size and quantity to perform their intended function.

.6 Provide extended interior trim at sills to cover the entire thickness of the exterior wall, including the gypsum board. Material to be no less than 3 mm thick, finish to match the interior finish of the window. Provide support and fasten securely with concealed fasteners so that the material will not deform under normal service loads.

.7 Glass as specified in Section 08 80 00 "Glazing": Sealed double glazing units with tempered glass outer panes.

.8 Glazing materials:
- .1 Glazing gaskets shall be extruded, black, closed cell or dense elastomer of durometer appropriate to the function.
- .2 Glazing tapes shall be macro-polyisobutylene, highly adhesive and elastic with continuous built-in shim.

.9 Weatherstripping: Manufacturer's standard for each application. Double weather-strip operable window units at all sash perimeters. Install all weather-stripping in specially extruded ports and secure to prevent shrinkage or movement.

.10 Hardware: Manufacturer's standard. For each vent, provide the following:
- .1 Pair of hinges designed to permit cleaning of the outside surface of the window from the suite interior.
- .2 Roto-operator with limiting device to restrict the opening to a maximum of 100 mm.
- .3 Claw handle.

.11 Galvanized steel flashings: ASTM A653, minimum 0.38 mm (28 ga) base metal thickness.

.12 Joint sealants: Butyl as recommended by the window manufacturer.

2.4 FINISHES

.1 Aluminum surfaces:
- .1 Finish exterior aluminum surfaces with superior performing organic coating to AAMA 2605. Colour: Black.
- .2 Finish interior aluminum surfaces with organic coating to AAMA 2603. Colour: White.
- .3 Prior to application of finish:
  - .1 Notching and welding to be completely executed.
  - .2 Exposed surfaces to be fine satin finished to ensure elimination of extrusion die marks and fabrication marks and to ensure uniformity of finish.

.2 Steel clips and reinforcement: 380 g/m^2 zinc coating to ASTM A123.

.3 Isolate aluminum from the following components by a heavy coating of bituminous coating:
- .1 Dissimilar metals except stainless steel, zinc or white bronze in small area.
- .2 Concrete, mortar and masonry.
- .3 Wood.

2.5 FABRICATION

.1 Fabricate framing from extrusions of size and shape shown on the reviewed shop drawings.

.2 Framing shall be two part construction integrated with a glass-reinforced nylon thermal break to form a rigid composite assembly without the use of fasteners or other thermal bridging elements.

.3 The composite frame assembly shall have a minimum resistance to shear between the aluminum and the thermal break materials of 4815 N/100 mm.

.4 Dry shrinkage of the thermal break shall not exceed 0.10% of the framing member length.

.5 Fixed framing shall be designed for screw spline corner construction. Operating vent sash extrusions shall be tubular with mitred, clip, adhesive, stake joint construction.

.6 All framing joints shall be accurately machined to allow site assembly and sealing, providing neat weathertight connections.

.7 Glass stops shall be lock-in screwless type.

.8 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.

.9 All glazing pockets shall be vented, pressure equalized and drained to the exterior.

.10 An elastomeric air-seal gasket shall be installed around the full perimeter of the glass and seated at corners with silicone sealant, properly adhered to the air seal gasket.

.11 Brace frames to maintain squareness and rigidity during shipment and installation.

.12 Provide structural anchors with an allowance for adjustment and welded after final window unit alignment. Touch-up with zinc-rich coating immediately following the alignment and fastening operation.

.13 Glaze windows and doors in accordance with the manufacturer's recommendations.

2.6 VENTILATOR SASH FABRICATION

.1 Ventilator sash shall be two-part construction with an extruded PVC thermal break integrated with the inner and outer extruded aluminum parts by a roll-crimping process to form a rigid assembly without the use of fasteners or other thermal bridging elements.

.2 All joints shall be drawn together and secured with screws driven through section walls into integral screw channels of adjoining sections.

.3 Accurately machine framing joints and assemble and seal to provide neat weathertight connections.

.4 Inner and outer parts of ventilator sash shall be tubular extrusions with two lines of extruded elastomeric weatherings retained in extruded splines in the windows frames.

.5 Glass stops shall be lock-in screwless type.

.6 Where required, provide shielded drainage and pressure equalizing vents. Provide sill weep system which will facilitate drainage of water accumulating in sill area while preventing passage of air, dirt and insects to interior.

.7 Position casement sections on main frame to provide direction of opening specified, free and smooth operation, without binding or sticking against main frame members.

.8 Insect Screens:
- .1 Frames: Extruded aluminum, finished to match window frame and rigidly joined at the corners.
- .2 Screen fabric: 18 x 16 fibreglass mesh.
- .3 Splines: Extruded elastomer, removable to permit re-screening.

2.7 ISOLATION COATING

.1 High build bituminous paint, SSPC Paint 12.

.2 Isolate aluminum from the following components by means of isolation coating:
- .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
- .2 Concrete, mortar and masonry.
- .3 Wood.

Part 3 Execution

3.1 EXAMINATION

.1 Examine areas and conditions under which the work is to be performed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.

.2 Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.

.3 Take field measurements to verify or supplement dimensions.

.4 Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 COORDINATION AND PREPARATION

.1 Anchorage Inserts: Coordinate with the concrete installer and ensure that inserts for anchorage which are required to be installed by that trade are supplied by this Section at the appropriate time in the construction schedule.

.2 Wood Blocking: Coordinate with Section 06 10 00 and ensure that wood blocking which is required for the proper installation of the windows is in place.

3.3 INSTALLATION

.1 Install the windows in accordance with the manufacturer's instructions and the reviewed shop drawings.

.2 Arrange components to prevent abrupt variation in colour.

.3 Set all frames and glazing material in their proper location, level, square, plumb, at proper elevations and in proper alignment with other work.

.4 Fasten securely.

.5 Touch-up field welds and anchoring brackets with 2 coats of galvanized zinc-rich paint. Surfaces must be clean, free of grease, paint, mill scale and rust prior to application of touch-up.

3.4 AIR/VAPOUR SEAL

.1 Ensure airtight connections with adjacent construction to maintain the airseal over the entire building envelope.

.2 Coordinate with the building air/vapour barrier installer and install air/vapour barrier transition strips at the interface with adjacent construction. Refer to details.

.3 Inspect the entire assembly for gaps in the air seal and make good.

.4 Fill all voids with polyurethane foam insulating sealant. Refer to Section 07 21 19.

3.5 CAULKING

.1 Seal the perimeter of the window frame against adjacent materials on the interior and exterior.

.2 Apply sealant in accordance with Section 07 92 00 "Joint Sealants". Conceal sealant within the window units except where exposed use is permitted by the Consultant. Colour of exposed sealant to match finish.

3.6 PROTECTION

.1 During and after installation protect the work of this Section from damage. Remove all corrosive or foreign material or droppings resulting from the work of this or other trades. Make good damage.

3.7 CLEANING

.1 Upon completion of the installation, remove from the premises all surplus material, dirt and debris caused by the work of this Section and leave the installation clean.

.2 Clean any drippage and spills of surplus sealant from adjacent surfaces.

.3 Make good any damage caused by the work of this Section.

.4 Just before Contract Closeout, or when directed by the Construction Manager, remove protective coating and clean all surfaces, using materials and methods recommended by the window manufacturer.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to install glazing, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 08 11 13 - Hollow Steel Doors and Frames.
- .2 Section 08 11 16 - Aluminum Doors and Frames.
- .3 Section 08 44 13 - Glazed Aluminum Curtain Wall.
- .4 Section 08 51 13 - Aluminum Windows.

1.3 REFERENCES

.1 American National Standards Institute (ANSI):
- .1 ANSI Z97.1-2015(R2020), Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB 12.1-2017, Safety Glazing.

.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 of Fire Tests of Window and Glass Block Assemblies.

1.4 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Samples: Submit sample of each glass type specified.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

1.6 WARRANTY

.1 For the work of this Section, the 12-months warranty period prescribed in the General Conditions of the Contract, is extended to 10 years.

.2 Warrant insulating glass units against defects and malfunction under normal usage, including failure of seal of enclosed air space and deposits on inner faces of glass detrimental to vision.

Part 2 Products

2.1 GLASS

.1 Insulating glass units for exterior windows, curtain wall, glazed doors and sidelights: To CAN/CGSB 12.8, as follows:
- .1 Outer pane: Clear tempered float glass to CAN/CGSB 12.1. Thickness to suit in-service loading conditions.
- .2 Cavity thickness as required, warm edge spacers, argon filled.
- .3 Inner pane: Clear tempered float glass to CAN/CGSB 12.1. Thickness to suit in-service loading conditions.
- .4 Low-E coating on third surface.
- .5 Overall unit thickness: Generally 25 mm. For doors to stile and rail profile.
- .6 Low-E coating on third surface.

.2 Spandrel glass: Clear tempered float glass to CAN/CGSB-12.1. Thickness: 6.4 mm.
- .1 Backpaint with ceramic frit.
- .2 Standard of acceptance: Ceramic Frit by Garibaldi Glass.
- .3 Colour to be selected by the Consultant.

.3 Non-fire-rated interior glazing: Clear tempered float glass to CAN/CGSB 12.1, Type 2, Class B; thickness as required by in-service loading conditions.

.4 Fire-rated interior glazing: 5 mm thick clear glazing material composed of fire-rated glass ceramic clear glazing material with surface-applied film for use in impact safety-rated locations with fire rating requirements ranging from 20 minutes to 3 hours with required hose stream test.
- .1 Standard of acceptance: Firelite^{R} NT manufactured by Nippon Electric Glass Co. Ltd. and distributed by Technical Glass Products.
- .2 Grade: Standard.
- .3 Fire performance:
  - .1 Classified and labelled by ULC.
  - .2 Tested in accordance with CAN/ULC S104 and CAN/ULC S106.
  - .3 Fire rating as indicated and in accordance with OBC requirements for each specific assembly.
- .4 Impact safety resistance: ANSI Z97.1 and OBC requirements.

2.2 GLAZING AND SEALING COMPOUND MATERIALS

.1 Glazing tape: preformed butyl tape, 10-15 durometer hardness, paper release, white colour, thickness and width as recommended by steel door and screen frame manufacturer.

.2 Setting blocks: Neoprene, Shore "A" durometer hardness 70 - 80, 100 mm long x 6 mm high x width to suit glass thickness.

.3 Spacer shims: Neoprene, Shore "A" durometer hardness 70-80, 75 mm long x 2.4 mm thick x 9 mm high.

.4 Primers, sealers and cleaners: to glass manufacturer's standard.

Part 3 Execution

3.1 EXAMINATION

.1 Examine areas and conditions under which work is to be performed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work.

.2 Do not proceed with the work until unsatisfactory conditions have been corrected to the satisfaction of the installer.

.3 Take field measurements to verify or supplement dimensions. Make necessary allowances for thermal movement as specified in Section 08910 "Glazed Aluminum Curtain Wall".

.4 Commencement of the installation will be construed as acceptance of the site conditions and, thereafter, the Trade Contractor shall be fully responsible for satisfactory work as specified herein.

3.2 WORKMANSHIP

.1 Remove protective coatings and clean contact surfaces with solvent and wipe dry.

.2 Apply primer-sealer to contact surfaces.

.3 Place setting blocks as per manufacturer's instructions.

.4 Install glass, rest on setting blocks, ensure full contact and adhesion at perimeter.

.5 Install removable stops, without displacing tape or sealant.

.6 Provide edge clearance of 3 mm minimum.

.7 Insert spacer shims to centre glass in space. Place shims at 600 mm o.c. and keep 6 mm below sight line.

.8 Do not cut or abrade tempered, heat treated, or coated glass.

3.3 GLAZING OF ALUMINUM DOORS, SIDELIGHTS, WINDOWS AND CURTAIN WALL

.1 Installation by the installer to system manufacturer's recommendations. Refer to Section 08 11 16 "Aluminum Doors and Frames", Section 08 44 13 "Glazed Aluminum Curtain Wall", and Section 08 51 13 "Aluminum Windows".

3.4 GLAZING OF HOLLOW STEEL DOORS AND FRAMES

.1 Hollow steel doors and frames: Dry method - tape/tape as follows:
- .1 Cut glazing tape to length and install against permanent stop, project 1.5 mm above sightline.
- .2 Place glazing tape on free perimeter of glass in same manner described above.
- .3 Screw-fasten glazing stops, in accordance with the manufacturer's instructions.

3.5 FINISHING

.1 Immediately remove sealant and compound droppings from finished surfaces. Remove labels after work is completed.

.2 Make good damage to adjacent finished surfaces.

3.6 CLEANING

.1 Upon completion of the work of this Section remove from the premises all surplus material, dirt and debris caused by the work.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to install gypsum board wall and ceiling finishes, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Work:
- .1 Section 09 22 16 - Non-Structural Metal Stud Framing.
- .2 Section 09 30 13 - Ceramic Tiling.
- .3 Section 09 51 13 - Suspended Acoustical Panel Ceilings.
- .4 Section 09 91 00 - Painting.

1.3 REFERENCES

.1 American Society for Testing and Materials:
- .1 ASTM A641/A641M-19, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- .2 ASTM A653/A653M-20, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM C11-18b, Standard Terminology Related to Gypsum and Related Building Materials and Systems.
- .4 ASTM C303-10(2016)e1, Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
- .5 ASTM C475/C475M-17, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .6 ASTM C754-20, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- .7 ASTM C840-20, Standard Specification for Application and Finishing of Gypsum Board.
- .8 ASTM C954-18, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
- .9 ASTM C1047-19, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- .10 ASTM C1178/C1178M-18, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel.
- .11 ASTM C1396/C1396M-17, Standard Specification for Gypsum Board.

.2 Underwriters' Laboratories Canada (ULC):
- .1 Design requirements for fire resistant assemblies.
- .2 CAN/ULC-S102-18, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.3 CAN/ULC-S114-18, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
.4 ULC S129-15, Standard Method Of Test For Smoulder Resistance of Insulation (Basket Method).
.5 CAN/ULC-S702.1:2014-AMD1, Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification.
.6 ULC S702.2-15, Mineral Fibre Insulation for Buildings, Part 2: Application Guidelines.

1.4 REGULATORY REQUIREMENTS

.1 Fire-resistance rated assemblies incorporating gypsum board: ULC fire resistive floor/ceiling and roof/ceiling design requirements.

1.5 DESIGN CRITERIA

.1 Design the suspended ceiling and bulkhead framing to be attached to and supported by the joists above. Attachment to the steel deck will not be permitted.

.2 The suspension system to be capable of safely supporting the weight of all items which are designed to be supported by it, including, but not limited to:
.1 Light fixtures.
.2 Diffusers.
.3 Other items supported by the ceiling system.

.3 Be advised that light fixtures will not be provided with separate support.

.4 Design the suspension system to withstand normal and seismic loads.

.5 Maximum deflection: 1/360 of span to ASTM C635 deflection test.

1.6 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Shop Drawings:
.1 Provide shop drawings for the metal framing for suspended ceilings and bulkeads.
.2 Clearly indicate layout and dimensions, member sizes, profiles and thicknesses, connection details, fastening methods, and other pertinent information.
.3 The ceiling and bulkhead framing, including all related connections and fastenings, shall be designed by a structural engineer permanently licensed to practise in the Province of Ontario. Each shop drawing submitted shall bear the stamp and signature of the aforesaid structural engineer.

.3 Post-installation certification: After installation, provide written certification , signed by the Structural Engineer responsible for the shop drawings, that all applicable items have been installed in accordance with the shop drawings.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

.2 Store materials inside, under cover and in accordance with the manufacturers' instructions.

.3 Keep materials dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

.4 Neatly stack gypsum panels flat to prevent sagging.

1.8 PROJECT CONDITIONS

.1 Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

.2 Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 4ºC. For adhesive attachment and finishing of gypsum board, maintain not less than 10ºC for 48 hours before application and continuously after until dry. Do not exceed 35ºC when using temporary heat sources.

.3 Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

Part 2 Products

2.1 STEEL FRAMING AND FURRING COMPONENTS

.1 General: Provide components complying with ASTM C754 for conditions indicated. Fabricate sheet steel products from Galvanized steel sheet to ASTM A653M with Z 180 hot-dipped galvanized finish.

.2 Anchors and Fasteners: Anchors and fastener of types suitable for the applications indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers, and with the capability to sustain, without failure and with a safety factor acceptable to the authorities having jurisdiction, the load imposed by ceiling construction and items supported by the ceiling.

.3 Wire Ties: ASTM A641/A641M, Class 1 zinc coating, soft temper, 1.6 mm thick.

.4 Hangers: As required by loading conditions and fire resistant design requirements to the satisfaction of the authorities having jurisdiction, one or more of the following:
- .1 Wire hangers: ASTM A641M, Class 1 zinc coating, soft temper, 4.1 mm diameter.
- .2 Hanger Rods: Mild steel and zinc coated.
- .3 Flat Hangers: Mild steel and zinc coated.

.5 Channels: Cold-rolled steel, 1.5 mm (16 ga) minimum base metal (uncoated) thickness and 11 mm wide flanges. Sizes as required by loading conditions and fire resistant design requirements.

.6 Steel Studs for Furring Channels: ASTM C645, 0.45 mm base metal thickness, unless otherwise indicated or required by loading conditions. Depth as indicated and as required by loading conditions.

.7 Steel Furring Channels:
- .1 Rigid: ASTM C645, hat shaped, depth of 22 mm, and minimum thickness of base (uncoated) metal of 0.45 mm (26 ga), unless otherwise indicated or required by loading conditions.
- .2 Resilient: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A653M or ASTM A568M to form 13 mm deep channel of single- or double-leg configuration: asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 38 mm wide face connected to flanges by double-slotted or expanded-metal legs (webs).

2.2 SHAFT WALL FRAMING

.1 Non-Loadbearing C-H stud framing to ASTM C645, roll-formed from 0.53 mm (25 ga) galvanized sheet, 64 mm stud size.

.2 Floor and ceiling runners: J-runners to ASTM C645, widths to suit stud sizes.

2.3 ACOUSTICAL INSULATION

.1 Acoustical fire batts: Mineral wool fibre batt insulation made from basalt rock and steel slag, conforming to CAN\ULC-S702, Type 1.
- .1 Density - 51 mm thickness (ASTM C303): 45 kg/m^3.
- .2 Fire performance:
  - .1 Flame spread index (CAN/ULC S102): 0
  - .2 Smoke developed index (CAN/ULC S102): 0
  - .3 Combustibility (CAN/ULC S114): Non-combustible.
  - .4 Smoulder resistance (CAN/ULC S129): 0.09%
- .3 Standard of acceptance: Rockwool AFB acoustical fire batt.

2.4 GYPSUM BOARD PRODUCTS

.1 General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application, thicknesses as indicated. Requirements as follows except where otherwise indicated:
- .1 Width: 1219 mm.

.2 Thicknesses: as indicated.
.3 Edges:
.1 For surfaces to be finished with joint compound: Tapered.
.2 For unfinished surfaces: Square.
.4 Ends: Square.

.2 Gypsum Board to ASTM C1396:
.1 Standard gypsum board unless otherwise indicated.
.2 Fire resistant gypsum board: Type X where required for fire-resistance-rated assemblies.
.3 Moisture resistant (MR) board: Provide MR board in selected rooms where indicated.
.4 Exterior grade where indicated.

.3 Liner board for shaftwall construction: 25 mm thick gypsum liner panels, bevelled edge, 609 mm wide, lengths as required; water-resistant green paper; identified with UL Classification Label.

.4 Glass-Mat, Water-Resistant Gypsum Backing Board to ASTM C1178:
.1 Proprietary gypsum board with silicone treated core and fibreglass-mat face and back, face side surfaced with heat-cured copolymer water and vapour retardant coating, thickness as indicated, square ends and edges.
.2 Standard of acceptance: Dens-Shield Tile Backer by Georgia-Pacific.

2.5 TRIM ACCESSORIES

.1 Accessories for Interior Installation: Cornerbead, edge trim, and control joints complying with ASTM C1047 and requirements indicated below:
.1 Material: Formed steel sheet zinc coated by hot-dip or electrolytic process.
.2 Shapes as required in accordance with ASTM C1047.
.1 LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.
.2 L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.
.3 One-piece control joint formed with V-shaped slot and removable strip covering slot opening.
.3 Note that standard "U" bead (J-trim) is not acceptable. Use "L" bead that is concealed when taped and filled.

2.6 JOINT TREATMENT MATERIALS

.1 General: Provide joint treatment materials complying with ASTM C475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

.2 Joint Tape for Gypsum Board: Paper reinforcing tape as recommended by the gypsum board manufacturer.

.3 Joint Compound for Gypsum Board: Factory-mixed, all-purpose compound formulated for both taping and topping compound.

2.7 MISCELLANEOUS MATERIALS

.1 General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

.2 Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum panels.

.3 Spot Grout: ASTM C475, setting-type joint compound recommended for spot-grouting hollow metal door frames.

.4 Fastening Adhesive for Metal: Special adhesive recommended for laminating gypsum panels to steel framing.

.5 Fasteners: Steel drill screws complying with ASTM C954 for fastening gypsum board to steel members from 0.84 mm to 2.84 mm (21 ga to 12 ga) thick.

.6 Acoustic sealant: Refer to Section 07 92 00 "Joint Sealants".

Part 3 Execution

3.1 COORDINATION

.1 Examine the mechanical and electrical drawings and coordinate with appropriate other trades to establish openings, additional support, furring out and other special provisions required for mechanical and electrical fixtures and fittings and access hatches built into the work of this Section.

.2 Examine the architectural drawings and coordinate with appropriate other trades to establish openings, additional support and other special provisions required for items built into or partially supported by the work of this Section.

3.2 SUSPENDED AND FURRED CEILINGS, INTERIOR SOFFIT FRAMING

.1 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C754 except where specified otherwise.

.2 Attach ceiling and soffit framing to structural steel members. Do not attach to steel deck.

.3 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm o.c. around perimeter of fixture.

.4 Install work level to tolerance of 1:1200.

.5 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles and similar items which penetrate the ceiling surface.

.6 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header tracks.

.7 Frame openings to receive ceiling-mounted access doors. Coordinate with Divisions 15 and 16.

3.3 CEILING BULKHEADS

.1 Frame for gypsum board faced vertical bulkheads within and at termination of ceilings.

.2 Frame for complex bulkheads in accordance with the drawings.

.3 Frame above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

3.4 GYPSUM BOARD APPLICATION

.1 Do not apply gypsum board until bucks, anchors, blocking, electrical and mechanical work are approved.

.2 Apply gypsum board to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm o.c.

.3 Apply water resistant gypsum board as a backer to ceramic tile, adjacent to slop sinks, in janitors closets and in other damp or humid locations where paint finish is to be applied.

.4 Conform to UL design requirements for fire resistance rated assemblies.

.5 Apply a 12 mm diameter bead of acoustic sealant continuously around the periphery of each face of partitioning to seal the gypsum board/structure junction where partitions abut fixed building components. Seal the full perimeter of cut-outs around electrical boxes, ducts and any other items which penetrate one or both faces of the partition, in partitions where the perimeter is sealed with acoustic sealant.

3.5 SHAFT WALL CONSTRUCTION

.1 Install C-H studs and liner panels progressively between J-runners attached to the floor and underside of the deck above.

.2 Space C/H studs at 609 mm o.c.and insert gypsum board edges into studs.

.3 Finish exterior side of the assembly as specified for regular gypsum board.

3.6 ACCESSORIES

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm o.c.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install glass fibre reinforced gypsum reflector and stepped cove panels where indicated. Fasten securely to substrate with drywall screws in accordance with the manufacturer's instructions.

.5 Install cove moulding where indicated, in accordance with the drawings.

3.7 CONTROL JOINTS

.1 Confirm locations of control joints with Consultant before installation.

.2 Construct control joints of preformed units except where otherwise shown. At junction of partitions with bulkheads, where indicated on the drawings, use two casing beads as indicated on the drawings.

.3 Set gypsum board facing in the preformed units or casing beads and support independently on both sides of joint.

.4 Provide continuous dust barrier behind and across control joints.

.5 Where not otherwise indicated, locate control joints at changes in substrate construction, at approximate 10 m spacing on long wall or partition runs, at approximate 15 m spacing on ceilings. Verify locations with the Consultant before installation.

.6 Install control joints straight and true.

3.8 ACCESS DOORS

.1 Install access doors to electrical and mechanical fixtures and electrical panelboards specified in respective Sections.

.2 Rigidly secure frames to furring or framing systems.

3.9 BATT INSULATION

.1 Where acoustical insulation is called for and where the batt insulation constitutes part of a fire resistant assembly, install batt insulation in strict accordance with the insulation manufacturer's written instructions, to maintain continuity of thermal, acoustical and fire protection to building elements and spaces.

.2 Apply single layer of insulation to produce thickness indicated, except where multiple layers are indicated or required to make up total thickness. Offset both vertical and horizontal joints in multiple layer applications.

.3 Use only insulation that is undamaged, dry, unsoiled, free from chipped or broken edges, and has not been exposed at any time to ice and snow.

.4 Cut and trim insulation to a neat compression-fit in spaces. Do not compress insulation excessively to fit spaces. Butt joints tightly. Use largest possible dimensions to reduce number of joints.

.5 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation in accordance with the manufacturer's instructions.

.6 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of chimneys and vents.

.7 Where necessary, retain insulation in position with mechanical fasteners recommended by the insulation manufacturer for the specific application.

.8 Do not enclose insulation until it has been reviewed and accepted by the Consultant.

3.10 ACOUSTICAL SEAL AT PARTITION PERIMETERS

.1 Minimize gaps between gypsum board and adjacent constructions and partition perimeters. Gaps greater than 13 mm wide are unacceptable.

.2 Gaps between 6 mm and 13 mm to be packed with back-up rod and caulked with acoustical sealant specified in Section 07 92 00 "Joint Sealants". Gaps below 6 mm do not require back-up rod.

.3 Apply acoustical sealant to the first layer of gypsum board and arrange for review by the Consultant before application of the second layer of gypsum board.

.4 Cut drywall neatly and tight around all penetrations at STC rated walls. Provide fitted drywall flanges around all mechanical penetrations. Complete drywall flange by caulking full perimeter to penetrations and adjacent gypsum board. Caulking to be reviewed by the Consultant before concealing.

.5 Stagger electrical outlets or mechanical installations on opposing sides of STC rated walls. Ensure sound attentuation insulation runs behind all penetrations. All electrical outlets to have vapour hoods and cover plate gaskets.

3.11 TAPING AND FILLING

.1 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.2 Finish corner beads, control joints, trim and joints in fibre reinforced panels 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 surface finish 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 blemishes.

3.12 GLASS MAT GYPSUM TILE BACKER INSTALLATION

.1 Install tile backer board in accordance with the manufacturer's recommendations and to the satisfaction of the ceramic tile installer.

.2 Place temporary 6 mm spacer strips around the lips of plumbing fixtures.

.3 Precut boards to required sizes and make necessary cutouts. Fit ends and edges closely but not tightly.

.4 Start by installing the boards adjacent to the spacer strips.

.5 Stagger end joints in successive courses.

.6 Fasten boards to steel studs and/or steel furring spaced at maximum 400 mm o.c. and to bottom plates with 32 mm steel screws at 200 mm o.c. with perimeter fasteners between 10 mm and 16 mm from the edges of the boards.

.7 Prefill panel joints, and joints where panels abut other surfaces such as gypsum board, with tile setting mortar or adhesive and then immediately embed joint tape and level the joints. Coordinate with the ceramic tile installer to ensure compatibility of joint treatment material.

.8 On portions of wall not to be tiled, apply tape over joints and angles and embed tape in joint compound. Trowel joint compound over the entire surface to produce a smooth surface.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to provide and install non-structural metal stud framing, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 09 21 16 - Gypsum Board Assemblies.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM C645-18, Standard Specification for Nonstructural Steel Framing Members.

.2 Underwriters' Laboratories Canada or Warnock Hersey design requirements for fire resistant assemblies.

1.4 REGULATORY REQUIREMENTS

.1 Fire-resistance rated floor/ceiling and roof/ceiling assemblies: Underwriters fire resistive floor/ceiling and roof/ceiling design requirements.

1.5 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Product Data:
- .1 Provide complete manufacturer's product data.
- .2 Include installation instructions for metal stud framing.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

Part 2 Products

2.1 METAL FRAMING

.1 Non-loadbearing channel stud framing: to ASTM C645, stud sizes, as indicated or as required by site conditions, minimum thickness 0.51 mm (25 ga), roll formed from, hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm o.c.

.2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, Flange height 32 mm.
- .1 Bottom channel: 32 mm.
- .2 Deflection channel (fixed to u/s structure): 65 mm.
- .3 Top channel: 50 mm.

.3 Bridging: fabricated from same material and finish as steel studs, 38 mm x 13 mm.

.4 Angle clips: fabricated from same material and finish as steel studs, 38 mm x 38 mm x depth of steel stud.

.5 Heavier gauge framing: Provide heavier gauge framing members and/or additional reinforcing where stud length and loading conditions require. Provide additional reinforcing for members carrying a concentrated load, such as door jambs.

.6 Soft joint filler:
- .1 Purpose-made, permanently elastic, ultra-high density polyurethane foam impregnated with polymer modified asphalt; density 450 g/m^3; colour black, 10 mm thick x 64 mm wide, except where otherwise indicated. Standard of acceptance:
  - .1 Emseal softjoint material (uncompressed) by Emseal Corp.
  - .2 Wall-Seal impregnated precompressed expanding foam sealant tape by Illbruck/USA.
- .2 Soft joint filler shall accept up to 60% compression of original size and retain permanent adhesion to both substrates.
- .3 Provide sizes to suit application in accordance with manufacturer's recommendations.

Part 3 Execution

3.1 ERECTION

.1 Erect stud systems for walls exceeding one storey in height in strict accordance with the reviewed and accepted shop drawings.

.2 Align partition tracks at floor and ceiling and secure at 600 mm o.c. maximum.

.3 When attaching studwork to intumescent paint coated structural steel, take care to maintain the integrity of the fire protection to the steel. Coordinate with Section 09 96 46 and make good any damage to the intumescent coating caused by the work of this section.

.4 Place studs vertically at 400 mm o.c. 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.

.5 Erect metal studding to tolerance of 1:1000.

.6 Extend partitions up to the underside of the deck and down to the slab below the access floor, except where noted otherwise on drawings. Maintain clearance under deck, beams and joists to avoid transmission of structural loads to studs. Use double track slip joint.
- .1 Install 50 mm deep deflection channel at top of partitions.
- .2 Nest 65 mm deep top track into deflection channel a minimum of 30 mm and a maximum of 40 mm. Do not fasten tracks together.
- .3 In STC-rated partitions, install soft joint filler to fill voids between the defletion channel and the top track.
- .4 Attach each stud to bottom track bottom and top tracks, using screws. For each stud, carefully align anchorages top and bottom.

.7 Brace steel studs with horizontal internal bridging at 1520 mm o.c. maximum. Fasten bridging to steel clips fastened to steel studs.

.8 Coordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.9 Coordinate erection of studs with Section 08 11 13 "Steel Doors and Frames" for the installation of steel door frames, with Section 06 10 00 "Rough Carpentry" for the installation of plywood and wood blocking to support wall mounted items. Coordinate with the applicable other Sections for special supports or anchorage for work specified in other Sections, including electrical and communications equipment, TV's., wall-mounted cabinets, toilet and bath accessories and miscellaneous other wall-mounted items. Provide additional studs as indicated and as required to support plywood panels.

.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 Erect track at head of door/window openings and sills of sidelight/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.

.12 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.13 Provide 40 mm stud, furring channel or wood blocking, secured between studs for attachments to steel stud partitions.

.14 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.15 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.16 Install two continuous beads of acoustical sealant or insulating strip under studs and tracks around perimeter of sound control partitions.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to install ceramic wall tile to the kitchen splashback, as indicated on the drawings, as specified herein and as required for a complete project

.2 Related Sections:
- .1 Section 09 21 13 - Gypsum Board Assemblies.

1.3 REFERENCES

.1 American National Standards Institute (ANSI):
- .1 ANSI A108/A118/A136.1:2019, American National Specifications for the Installation of Ceramic Tile.

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-75.1-M88, Tile, Ceramic.

.3 Terrazzo Tile and Marble Association of Canada (TTMAC):
- .1 2019/2021 Specifications Guide 09 30 00 Tile Installation Manual.

1.4 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Samples: Submit duplicate samples of each type of tile, grout and trim proposed for use.

.3 Maintenance Data:
- .1 Provide maintenance data for cleaning and maintenance of ceramic and quarry tile floors and walls for incorporation into manual specified in Section 01 78 00 "Closeout Submittals".

.4 Maintenance Material
- .1 Provide maintenance materials in accordance with Section 01 78 00 "Closeout Submittals".
- .2 Provide one unopened carton of each type and colour of tile required for the project, for maintenance use. Store where directed.
- .3 Maintenance material to be of same production run as installed material.
- .4 Do not use maintenance materials for the correction of deficiencies or remedial work during the warranty period.

1.5 ENVIRONMENTAL CONDITIONS

.1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12°C for 48 hours before, during, and 48 hours after, installation.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

Part 2 Products

2.1 MANUFACTURERS

.1 The surface preparation materials, setting bed, and grout specification is based on products by Mapei Inc.

.2 Subject to compliance with the specification requirements, equivalent products by the following manufacturers are acceptable alternatives:
- .1 Laticrete International Inc.
- .2 Alpha-Vico Canada Ltd.
- .3 TEC Inc., and H.B. Fuller Company, distributed by Centura.

.3 Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 - "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

2.2 TILE

.1 Wall tile to be selected.

.2 Neatly cut and grind edges of tiles as required, at bases and at edges at exposed perimeters of tiling.

.3 All cut edges shall be machine-cut and arises (edges) shall be ground and bevelled to match manufactured edges.

2.3 SURFACE PREPARATION MATERIALS

.1 Spot patching and build up 13 mm or less: Ultra/Plan self-levelling cementitious underlayment compound.

2.4 SETTING MORTARS AND ADDITIVES

.1 Kerabond dry set mortar.

.2 Keralastic polymer additive.

2.5 GROUTS AND ADDITIVES

.1 Grout: Keracolor/Wall unsanded.

.2 Additive: Plastijoints acrylic grout additive.

.3 Grout colours to be selected.

Part 3 Execution

3.1 PREPARATION

.1 Apply tile or backing coats to clean and sound surfaces which are true to line and plumb.

.2 Use patching and/or levelling compounds, in accordance with manufacturer's instructions, to correct any defects in the substrate.

3.2 WORKMANSHIP

.1 Install ceramic tile in strict accordance with the manufacturer's instructions.

.2 Fit tile around corners, fitments, fixtures, and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even.

.3 Maximum surface tolerance 1:800.

.4 Make joints between tile uniform, plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout not visible after installation. Align patterns.

.5 Except where otherwise indicated, lay out tiles so perimeter tiles are minimum 1/2 size.

.6 Sound tiles after setting and replace hollow- sounding units to obtain full bond.

.7 Make internal angles square. Make external angles with rounded bullnosed profile.

.8 Clean installed tile surfaces after installation and grouting cured.

.9 Make control joints where indicated. Install divider strips in accordance with the manufacturer's instructions.

3.3 TILE INSTALLATION

.1 Install ceramic tiles in accordance with applicable TTMAC details.

3.4 CLEANING

.1 Upon completion of the installation remove from the premises all surplus material, dirt and debris caused by the work of this Section and leave the installation clean and ready for the intended use by the Owner.

.2 Clean any drippage and spills of surplus material from adjacent surfaces and make good any damage caused by the work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to fabricate and install suspended acoustical panel ceilings, including suspension grids and lay-in acoustical ceiling panels, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 09 21 16 - Gypsum Board Assemblies: Suspended gypsum board ceilings and bulkheads.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM A641/A641M-19, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- .2 ASTM A653/A653M-20, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM C423-17, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- .4 ASTM C635/C635M-17, Standard Specification for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
- .5 ASTM C636/C636M-19, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- .6 ASTM E1264-19, Standard Classification for Acoustical Ceiling Products.

1.4 QUALIFICATIONS

.1 The work of this Section shall be fabricated by a manufacturer with minimum five (5) years experience in the actual production of the specified products.

1.5 DESIGN CRITERIA:

.1 The suspension system to be capable of safely supporting the weight of all items which are designed to be supported by it, including, but not limited to:
- .1 Light fixtures.
- .2 Diffusers.
- .3 Other items supported by the ceiling system.

.2 Be advised that light fixtures will not be provided with separate support.

.3 Design the suspension system to withstand normal and seismic loads.

.4 Size attachment components for five times the design load indicated in ASTM C635, Table 1, direct hung except where otherwise indicated.

.5 Size hanger wire for three times the design load indicated in ASTM C635, Table 1.

.6 Maximum deflection: 1/360 of span to ASTM C635 deflection test.

.7 Design the suspension system to provide lateral support to the tops of partitions which are attached to it.

1.6 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Samples: Submit a sample of each type of acoustical unit.

.3 Shop Drawings:
- .1 Show complete details of the suspension system.
- .2 The suspension system, including all related connections and fastenings, shall be designed by a structural engineer licensed to practise in the Provide of Ontario. Each shop drawing submitted shall bear the stamp and signature of the aforesaid structural engineer.

.4 Post-Installation Certification: After installation, provide written certification, signed by the Structural Engineer responsible for the shop drawings, that all items have been installed in accordance with the shop drawings.

.5 Maintenance Materials
- .1 Provide 1 unopened carton of ceiling panels.
- .2 Deliver to site and store where directed.
- .3 Maintenance materials to be of the same production run as the installed materials.
- .4 Do not use maintenance materials for the correction of deficiencies or remedial work during the warranty period.

1.7 ENVIRONMENTAL CONDITIONS

.1 Commence installation only after the building is enclosed, sufficient heat is provided and dust generating activities have terminated.

.2 Permit wet work to dry before commencement of installation.

.3 Maintain a uniform minimum temperature of 15°C and a relative humidity of 20% - 40% before and during installation.

.4 Store materials in the work area for not less than 48 hours prior to installation.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials, including packaging materials, generated by the work of this Section in accordance with the Waste Management Plan.

Part 2 Products

2.1 MANUFACTURERS

.1 This Specification is based on suspension system and ceiling panels as manufactured by CGC Interiors.

.2 Subject to compliance with the specification requirements, equivalent products by Armstrong World Industries Canada Limited are acceptable alternatives:

.3 Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 "Substitution Procedures". Acceptance of alternative products is subject to the approval of the Consultant.

2.2 SUSPENSION SYSTEM

.1 To ASTM C365, exposed tee system, as follows:
- .1 Material: Double web electrogalvanized sheet steel.
- .2 Face dimension: 24 mm.
- .3 Surface finish: Baked polyester paint, colour white.
- .4 Grid dimensions: To suit panel size.
- .5 Standard of Acceptance: Donn DXL.

.2 Provide all accessories, including matching hemmed angle wall mouldings, #9 galvanised soft annealed steel hanger wire and suspension system accessories as required for a complete installation.

2.3 ACOUSTICAL CEILING PANELS

.1 Acoustical ceiling panels to be selected.

2.4 ACCESSORY MATERIALS

.1 Suspension system accessories: splices, clips, wire ties, retainers and wall moulding to complement the suspension system components, as recommended by the system manufacturer.

.2 Hanger wire: Galvanized soft annealed steel wire to ASTM A641, Class 1, 2.6 mm diameter, prestretched

.3 Hanger inserts: purpose made.

.4 Retention clips: Armstrong Product No. 414, purpose made clips to secure tile to suspension system.

.5 Touch-up paint: type and colour to match acoustical units, as provided by the acoustical unit manufacturer.

Part 3 Execution

3.1 INSTALLATION: SUSPENSION SYSTEM

.1 Install ceiling suspension system to ASTM C636 and in accordance with the manufacturer's printed instructions.

.2 Furnish hanger clips and inserts for installation by the applicable other Sections, with instructions for their correct placement.

.3 Secure hangers to the overhead structure using attachment methods acceptable to the Consultant,

.4 Except where otherwise indicated, lay out the grid symmetrically with border widths not less than 50% of standard unit widths.

.5 Coordinate the ceiling system with related components.

.6 Hang the suspension system independently of walls, columns, ducts, pipes and conduit. Provide additional hangers and carrying channels as necessary.

.7 Provide additional hangers and framing as necessary to carry the weight of all items which are designed to be supported by the suspension system.

.8 Frame at openings for light fixtures, air diffusers, speakers, and at changes in ceiling height.

.9 Provide additional hangers at light fixtures, air diffusers, speakers, and other ceiling-supported items within 150 mm of each corner and at maximum 600 mm o.c. around the perimeter of the fixture.

.10 Attach cross members to main runners to provide a rigid assembly.

.11 Install wall trim to provide correct ceiling height. Install wall trim or suitable edge moulding to match existing at the interface between the acoustic tile ceiling and other materials, for the entire length of the joint. Secure to construction. Butt joints tightly, neatly, square, and in true alignment.

.12 Arrange recessed items to replace or be centred on a panel unless indicated otherwise.

.13 Finished ceiling system to be square with adjoining walls and level within 1:1000.

3.2 INSTALLATION: PANELS

.1 Install acoustical panels in the ceiling suspension system, in accordance with the manufacturer's instructions.

.2 Fit acoustical panels in place, free from damaged edges or other defects detrimental to appearance or function.

.3 Install acoustical panels level, in uniform plane and free from twist, warp, dents, damaged edges or other defects detrimental to appearance or function.

.4 Cut panels to fit irregular grids and perimeter edge trim. Reconstruct tegular edge profile on perimeter cut panels in accordance with the manufacturer's instructions.

.5 Install retention clips within 6 m of exterior doors.

END OF SECTION

Part 1 General

1.1 RELATED DOCUMENTS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

.1 Work Included: The work of this Section includes the provision of all labour, materials, equipment and services required to execute interior and exterior painting work, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 08 11 13 - Steel Doors and Frames
- .2 Section 09 21 16 - Gypsum Board Assemblies.

1.3 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.2 Master Painters Institute (MPI):
- .1 MPI Architectural Specification Manual, 2018 (referred to herein as "MPI Manual")
- .2 MPI Approved Product List, (referred to herein as "MPI APL").

1.4 SUBMITTALS

.1 General: Submit each item in this Article according to the Conditions of the Contract and the applicable Division 01 Specification Sections.

.2 Product Data:
- .1 Submit product data and instructions for each paint and coating product to be used.
- .2 Submit product data for the use and application of paint thinner.
- .3 Submit 2 copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) Indicate VOCs during application and curing.
- .4 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Submit manufacturer's application instructions.

1.5 STORAGE AND HANDLING

.1 Storage and Protection:
- .1 Provide and maintain dry, temperature controlled, secure storage.
- .2 Store materials and supplies away from heat generating devices.
- .3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.

.2 Fire Safety Requirements:
- .1 Provide one 9 kg 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.

1.6 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:
- .1 Ventilate enclosed spaces.
- .2 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:
- .1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
- .2 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.

.3 Airborne Dust: 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.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Waste Management Coordinator in the implementation of the Waste Management Plan specified in Section 01 74 21 "Waste Management and Disposal". Handle and dispose of waste materials generated by the work of this Section, including packaging materials, in accordance with the Waste Management Plan.

Part 2 Products

2.1 MATERIALS

.1 Only paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Provide paint materials for each paint system from a single manufacturer.

.3 Conform to latest MPI requirements for all painting work including preparation and priming.

.4 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Manual and APL.

.5 Provide paint products meeting MPI "Environmentally Friendly" E2 rating or better, based on VOC (EPA Method 24) content levels. Where the APL lists products with E3 rating, select products from among those which have the E3 rating.

2.2 COLOURS

.1 For paint colours, refer to the Interior Design Package.

.2 The reference to specific paint manufacturers is intended only to identify required paint colours and is not intended to exclude other manufacturers' products which comply with the requirements of this specification section.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written instructions. Obtain written approval from the Consultant for tinting of painting materials.

.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 is defined as sheen rating of applied paint, in accordance with following values:

Gloss Level	Description	Gloss @ 60°	Gloss @ 85°
1	Matte or flat finish	max. 5	max. 10
2	Velvet-like finish	max. 10	10 to 35
3	Eggshell finish	10 to 25	10 to 35
4	Satin-like finish	20 to 35	min. 35
5	Traditional semi-gloss finish	35 to 70	
6	Traditional gloss finish	70 to 85	
7	High-gloss finish	> 85	

.2 Gloss level ratings of painted surfaces as specified herein.

2.5 EXTERIOR PAINTING

.1 Paint exterior surfaces in accordance with the following MPI Architectural Specification Manual requirements, premium Grade throughout.

.2 For steel surfaces to receive paint finish, apply EXT 5.1D: Alkyd, G5 finish, Premium grade.

.3 For galvanized metal surfaces (not chromate passivated) to receive paint finish, apply EXT 5.3B: Alkyd, G5 finish, Premium grade.

.4 For dimension lumber to receive stain finish, apply EXT 6.2B: Waterborne solid colour stain finish, Premium grade.

.5 For dressed lumber to receive paint finish, apply EXT 6.3A: Latex, G5 finish, Premium grade.

2.6 INTERIOR PAINTING

.1 Paint interior surfaces in accordance with the following MPI Architectural Specification Manual requirements, premium Grade throughout.

.2 For concrete vertical surfaces to receive paint finish, apply INT 3.1C: High performance architectural latex, G4 finish.

.3 For concrete floor surfaces to receive epoxy finish, apply INT 3.2C: Epoxy.

.4 For concrete masonry surfaces to receive paint finish, apply INT 4.2D: High performance architectural latex, G4 finish.

.5 For wood surfaces to receive paint finish, apply INT 6.3A: High performance architectural latex, G5 finish.

.6 For wood surfaces to receive stain finish, apply INT 6.3E: Semi-Transparent Stain, polyurethane varnish, G4 finish.

.7 For wood surfaces to receive clear finish, apply INT 6.2H: Clear polyurethane varnish, G4 finish.

.8 For plaster and wallboard surfaces, to receive latex paint finish, apply INT 9.2B: High performance architectural latex, gloss level as follows:
- .1 Ceilings: G2
- .2 Walls:
  - .1 Public Spaces, kitchens and bathrooms: G4
  - .2 Within units except bathrooms: G3

.9 For miscellaneous steel (factory primed), apply INT 5.1E: Alkyd G5 finish.

.10 For zinc-coated steel, apply INT 5.3C: Alkyd G5 finish over cementitious primer.

Part 3 Execution

3.1 GENERAL

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

.2 Perform preparation and operations for painting in accordance with MPI Manual except where specified otherwise.

3.2 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to the Construction Manager damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.3 PREPARATION

.1 Protection:
- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by the Consultant.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.

.2 Surface Preparation:
- .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
- .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
- .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of the Construction Manager.

.3 Clean and prepare surfaces in accordance with MPI Manual specific requirements and coating manufacturer's recommendations.

.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 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.

.8 Touch up of shop primers with primer as specified.

.9 Do not apply paint until prepared surfaces have been accepted by the Consultant.

3.4 APPLICATION

.1 Method of application to be as approved by the Construction Manager. Conform to manufacturer's application instructions unless specified otherwise.

.2 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.3 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by the manufacturer.

.4 Sand and dust between coats to remove visible defects.

.5 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.6 Finish inside of cupboards and cabinets as specified for outside surfaces.

.7 Finish closets and alcoves as specified for adjoining rooms.

.8 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.5 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Paint conduits, piping, hangers, ductwork and other mechanical and electrical equipment exposed in finished areas, to match adjacent surfaces, except as indicated.

.2 Do not paint over nameplates.

.3 Keep sprinkler heads free of paint.

.4 Paint fire protection piping red.

.5 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.6 Paint natural gas piping yellow.

.7 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.

END OF SECTION