DIVISION 06 WOOD, PLASTICS, AND COMPOSITES

DIVISION 07 THERMAL AND MOISTURE PROTECTION

DIVISION 08 OPENINGS

DIVISION 09 FINISHES

END OF DOCUMENT

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 compliancies of the substitutions meet or exceed the properties and compliancies 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 compliancies of the specified materials, products or systems with the properties and compliancies 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 compliancies of the specified materials, products or systems with the properties and compliancies 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 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 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 Sheet Size: 660 x 1000 mm (26" x 40")
- .2 Submit: One reproducible sepia or mylar copy and two (2) white prints of each drawing.
- .3 Requirements: Spec. Section 01 33 00 Subsections:
  - .1 Coordination of submission.
  - .2 Submission requirements.

.5 Trade Literature Format Submissions:
- .1 Sheet Sizes: 215 x 280 mm (8-1/2" x 11").
- .2 Submit: Three (3) copies printed on the left side of 430 x 280 mm (17" x 11") sheets, leaving the right side clear to receive review stamps.
- .3 Requirements: Spec. Section 01 33 00. Subsections:
  - .1 Product data.
  - .2 Coordination of submission.
  - .3 Submission requirements.

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 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 Constructionn 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:
- .1 Project Record Documents: Refer to Section 01 78 39.
- .2 Operation and Maintenance Manual: Refer to Section 01 78 23. Include:
  - .1 Warranties and maintenance service agreements: Refer to Section 01 78 36.
  - .2 Final shop drawings: Refer to Section 01 33 00.

.2 Where called for in the applicable specification sections, provide spare parts and maintenance materials. Refer to Section 01 78 43.

.3 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

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 demolish selected portions of the existing buildings, as necessary for the execution of the new work, as indicated on the drawings, as specified herein and as required for a complete project.

1.3 REFERENCES

.1 Canadian Standards Association (CSA):
.1 CSA-S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

1.4 EXISTING CONDITIONS

.1 Should material resembling spray or trowel applied asbestos or any other designated substance be encountered in the course of demolition, stop work, take preventative measures, and notify the Consultant immediately. Do not proceed until written instructions have been received.

.2 The portions of the buildings to be demolished to be based on the condition of the buildings at the time of examination prior to tendering.

1.5 DEMOLITION DRAWINGS

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

.2 Submit drawings stamped and signed by qualified professional engineer registered or licensed in the Province of Ontario.

1.6 PROTECTION

.1 Prevent movement, settlement or damage to parts of the existing building to remain. Provide bracing, shoring and underpinning as required. Repair damage caused by demolition as directed by the Consultant.

.2 Support affected structures and, if the safety of the structure being demolished appears to be endangered, take preventative measures and then cease operations and notify the Consultant.

.3 Perform all work in accordance with Section 01 35 43 "Environmental Protection".

.4 Prevent debris from blocking the surface drainage system, elevators, or mechanical and electrical systems which must remain in operation.

.5 Ensure that demolition work does not contribute to excess air and noise pollution.

.6 Fires and burning of waste or materials is not permitted on site.

.7 Do not bury waste or materials on site.

.8 Do not dispose of waste or volatile materials such as: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers. Ensure proper disposal procedures are maintained throughout project.

.9 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.

.10 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.

.11 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.

.12 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all roads.

.13 Where the Work involves demolition of portions of the existing building immediately adjacent to other work which is designated to remain, take care to protect the adjacent work from damage during demolition.

.14 Protect finished surfaces designated to remain. Where existing finishes are to be partially removed or abut other items which are to be demolished, make accurate, clean, straight cuts, true-to line, as required to facilitate the proper execution of the new work.

1.7 REGULATORY REQUIREMENTS

.1 Ensure work is performed in compliance with all applicable provincial regulations.

Part 2 Products

2.1 EQUIPMENT

.1 Equipment and heavy machinery to meet or exceed all applicable emission requirements.

.2 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

Part 3 Execution

3.1 PREPARATION

.1 Disconnect electrical and telephone service lines in the areas of the building where demolition work is to be carried out. Post warning signs on electrical lines and equipment which must remain energized to serve other parts of the building during the period of demolition.

.2 Disconnect and cap mechanical services where necessary.

.3 Do not disrupt active or energized utilities that are designated to remain undisturbed.

3.2 SAFETY CODE

.1 Do demolition work in accordance with CSA S350 governing construction/demolition safety regulations.

.2 Blasting operations are not permitted during demolition.

3.3 DEMOLITION

.1 Demolish parts of the structure as necessary to permit new construction work as indicated.

.2 At the end of each day's work, leave the work in a safe and stable condition. Protect interiors from exterior elements at all times.

.3 Demolish to minimize dusting. Where appropriate, keep materials wetted as directed by the Consultant.

.4 Remove and dispose of demolished materials except where noted otherwise and as directed by the Consultant and in accordance with Section 01 74 21 "Waste Management and Disposal" and the authorities having jurisdiction.

.5 Protect existing items which are designated to be removed and stockpiled for renovation and re-use or to be handed over to the Owner.

.6 Remove contaminated or dangerous materials as defined by authorities having jurisdiction relating to environmental protection, from site and dispose of in a safe manner to minimize danger at the site or during disposal.

.7 Use natural lighting to work by wherever possible. Shut off all lighting except those required for security purposes at the end of each day.

END OF SECTION

INSERT STRUCTURAL CONCRETE SECTIONS

[by Structural Engineer]

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:
- .1 The work of this Section includes the provision of all labour, materials, equipment and services required to engineer and install an insulated concrete forming (ICF) system for the exterior walls, as indicated on the drawings, as specified herein and as required for a complete project.
- .2 The work includes, but is not necessarily limited to:
  - .1 The structural engineering design of the entire system.
  - .2 The supply and installation of the ICF system - permanent insulating concrete forming system, complete with all necessary components.
  - .3 The supply and placement of steel reinforcement
  - .4 Concrete fill to cores, bond beams and lintels (Refer to Section 03 30 00 "Cast-in-Place Concrete")
  - .5 Installation of miscellaneous items to accommodate the work of other Sections, supplied by the respective Sections, including:
    - .1 Service penetration sleeves
    - .2 Inserts
    - .3 Hold-downs and anchors
    - .4 Bolts
    - .5 Window and door bucks (openings)

.2 Single source responsibility: Engage a single firm to assume undivided responsibility for the work of this Section, including the steel reinforcement specified in Section 03 20 00 and the cast-in place concrete work specified in Section 03 30 00 "Cast-in-Place Concrete".

.3 Related Sections:
- .1 Section 03 20 00 - Concrete Reinforcement.
- .2 Section 03 30 00 - Cast-in-Place Concrete.
- .3 Section 04 20 00 - Unit Masonry.
- .4 Section 05 50 00 - Metal Fabrications.
- .5 Section 06 10 00 - Rough Carpentry.
- .6 Section 07 27 26 - Fluid-Applied Air/Moisture Barrier

1.3 REFERENCES

.1 American Concrete Institute (ACI):
- .1 ACI 347-04, Guide to Formwork for Concrete.
- .2 ACI 347.2R-05, Guide for Shoring / Reshoring of Concrete Multistory Buildings.

.2 American Society for Testing and Materials (ASTM):
- .1 ASTM C165-07(2012), Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
- .2 ASTM C203-05a(2012), Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
- .3 ASTM C303-10, Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
- .4 ASTM C518-15, Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- .5 ASTM D635-14, Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
- .6 ASTM D638-14, Standard Test Method for Tensile Properties of Plastics.
- .7 ASTM D1621-10, Standard Test Method for Compressive Properties of Rigid Cellular Plastics..
- .8 ASTM D1622/D1622M-14, Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- .9 ASTM D1761-12, Standard Test Methods for Mechanical Fasteners in Wood.
- .10 ASTM D2842-12, Standard Test Method for Water Absorption of Rigid Cellular Plastics.
- .11 ASTM D2843-10, Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
- .12 ASTM E84-15a, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .13 ASTM E96/E96M-14, Standard Test Methods for Water Vapor Transmission of Materials.

.3 Canadian Standards Association (CSA):
- .1 CSA-A23.1\A23.2-09(R2014), Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.4 Underwriters' Laboratories of Canada (ULC):
- .1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene Boards and Pipe Covering.

1.4 DEFINITIONS

.1 *Wall Alignment System:* Bracing that acts as an alignment/scaffold system designed for use with insulated concrete forms.

.2 *Trade Contractor:* The Trade Contractor contracted to install the ICF system, and who has training and experience in the installation of permanent insulated concrete forms.

.3 *Technical Advisor:* An individual who has the training and experience to assist in the installation of permanent insulated concrete forms. The role of the Technical Advisor shall be as technical support to the Trade Contractor. The Technical Advisor may be a representative of the distribution firm or the manufacturer of the ICF system.

.4 *EPS:* Acronym for "Expanded Polystyrene", the foam component of the ICF system.

.5 *ICF:* Acronym for "Insulated Concrete Form".

.6 *ICF system:* Refers to the complete ICF forming system including related components listed herein.

.7 *Service Penetrations:* Services such as electrical wiring, pipes, ventilation systems, etc.that are installed in or through the walls of the ICF.

1.5 SYSTEM DESCRIPTION

.1 The ICF system shall consist of two flame-resistant EPS boards separated by polypropylene webs. The EPS boards shall be manufactured using BASF Neopor bead resins.

.2 The ICF system shall be solid form units or knock-down forms or a combination of both, referred to as hybrid forms.

.3 The EPS foam boards shall be minimum the thickness indicated on the drawings. respectively.

.4 The webs shall separate the EPS boards to form cavities which create the concrete wall thicknesses and overall wall thicknesses indicated.

.5 The webs shall be spaced at 203 mm o.c. horizontally and 406 mm o.c. vertically, and contain a 32 mm wide furring strip that extends the height of each ICF block. The furring strips shall facilitate fasteners for attachment of both exterior and interior finishes.

.6 A furring strip shall be located in the corners of corner forms. The furring strip shall consist of both a vertical and horizontal component. The vertical component shall extend nearly the full height of the form, extend a minimum of 64 mm from both sides of the corner, and a minimum of 5 mm thick. The horizontal component shall be minimum 51 mm in height, extend a minimum of 152 mm from both sides of the corner, and a minimum of 5 mm thick.

.7 The webs shall facilitate rebar placement in accordance with CSA-A23.1

1.6 DESIGN/PERFORMANCE REQUIREMENTS

.1 The EPS material shall meet the following design/performance criteria:
- .1 Expanded polystyrene board to CAN/ULC-S701, Type I.
- .2 RSI value of insulation (ASTM C518): 0.83 $m^2.^oC/W$ per 25.4 mm.
- .3 RSI value of wall assembly (Intertek Testing Services Evaluation Report) including interior air film, 13 mm gypsum board and 102 mm concrete core: 4.75 $m^2.^oC/W$.
- .4 Water absorption (ASTM D2842): 1.0%
- .5 Water vapour presence (ASTM E96): 148 Ong/Pa-s-m^2
- .6 Compressive strength (ASTM D1621 and C165): 114 kPa
- .7 Flexural strength (ASTM C203): 292 kPa
- .8 Density (ASTM C1622 and C303): 22.05 kg/m^3
- .9 Dimensional stability (change in dimensions) (ASTM C303):
  - .1 @70^{o}C and 97% RH:
    - .1 Length: -0.54%
    - .2 Width: -0.56%
    - .3 Thickness: -0.53%

.2 @-40°C:
.1 Length: -0.09%
.2 Width: -0.11%
.3 Thickness: -0.03%

.10 Fire performance (ASTM E84):
.1 Flame spread rating: <25
.2 Smoke developed rating: <450

.11 Sound transmission ASTM E90:
.1 159 mm wall system: STC 56
.2 102 mm wall system: STC 50

.2 The Polypropylene web material shall meet the following design/performance criteria:
.1 Flammability (ASTM D635):
.1 Flame front distance = 102 mm
.2 Average linear burn rate = 17.9 mm /min.
.2 Smoke density rating (ASTM D2843): 19.1%
.3 Fastener resistance (ASTM D1761):
.1 Average lateral fastener resistance of drywall screws: 1.63 kN
.2 Average withdrawal fastener resistance of drywall screws: 0.75 kN
.3 Average withdrawal resistance of 1.59 mm staples: 105 N
.4 Average withdrawal resistance of #8 wood screw, 51 mm long: 920 N (application to corner web flanges only).
.4 Average tensile strength of polypropylene web (ASTM D638): 3.75 kN

1.7 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 dimensioned layout of ICF walls, steel reinforcement, details at corners, lintels bond beams, openings and other interface with other work, and other pertinent information.
.2 Include details of the wall alignment/bracing system.
.3 The ICF system, including all related reinforcement, 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 Samples: Submit a full size sample of a typical ICF unit and a full size sample of each special purpose unit.

.4 Product Data:
.1 Provide complete manufacturer's product data.
.2 Include the manufacturer's Product/Design Manual.
.3 Include installation instructions for the ICF system.
.4 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.

.5 Source Quality Control: If requested by the Consultant, submit laboratory test reports certifying compliance of the EPS insulation and the polypropylene web material with specification requirements.

.6 Code Compliance Certificates: Submit relevant code compliance certificates including Greenguard Indoor Air Quality Certificate of Compliance

1.8 QUALITY ASSURANCE

.1 Qualifications:
- .1 Trade Contractor shall be ICF trained and experienced.
- .2 Installers of ICF shall provide proof of training documentation.
- .3 A manufacturer's technical representative shall be available to supervise construction on a regular basis.

.2 Regulatory Requirements:
- .1 Trade Contractor, including trades working under the Trade Contractor, shall comply with local building code and regulatory requirements.
- .2 Installation of ICF shall comply with ACI 347.

.3 Pre-installation Meeting:
- .1 A preinstallation meeting will be held the day before installation starts, with the following present:
  - .1 Construction Manager
  - .2 Consultant
  - .3 Manufacturer's technical representative
  - .4 Trade Contractor
  - .5 Other affected trade contractors.
- .2 The agenda shall include coordination of the delivery, storage and handling of ICF including ICF and the specified related components.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
- .1 ICF shall be delivered on-site in original factory packaging. All delivered ICF products shall show traceability by the inclusion on the identification label of the location of manufacturing plant, product description, batch/lot number and date produced.
- .2 Exercise care in handling and unloading ICF onto the construction site to minimize damage to the EPS boards and/or webs.
- .3 ICF shall remain in original factory packaging until ready for installation.

.2 Store ICF in an area that will minimize damage or soiling to ICF products.

.3 Provide protection where stored products of ICF could be exposed for more than 2 weeks to UV or freezing rain or snow conditions.

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.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on LOGIX ICF system.

.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 MANUFACTURED UNITS

.1 Assembled form blocks to manufacturer's standard, 406 high x 1219 long x thickness as indicated.

.2 Provide special shapes as required, including:
- .1 Brick Ledge, 406 high x 1219 long x 70 mm thick, ledge extending 149 mm from face of concrete
- .2 Corbel ledge, 406 high x 1219 long x 70 mm thick, ledge extending 95 mm from face of concrete.
- .3 Taper top, 406 high x 1219 long x 70 mm thick, extending 45 mm from face of concrete at tapered end.
- .4 90° corner: 406 high x 70 mm thick, length to suit concrete core thickness.
- .5 45° corner: 406 high x 70 mm thick, length to suit concrete core thickness.
- .6 Half height standard, 203 high x 1219 long x thickness as indicated.
- .7 Half height 90° corner: 203 high x 70 mm thick, length to suit concrete core thickness.
- .8 Half height 45° corner: 203 high x 70 mm thick, length to suit concrete core thickness.
- .9 End cap: 406 high x 70 mm thick.
- .10 Pilaster: 406 high x 70 mm thick, providing a pilaster 406 mm wide, extending from face of concrete by the dimension indicated.

.3 Provide furring strips as recommended by the manufacturer to suit application.

2.3 CONCRETE AND REINFORCING STEEL

.1 Structural design of reinforced concrete shall comply with CAN/CSA-A23.1 / A23.2 as applicable.

.2 Maximum aggregate sizes:
- .1 For 102 mm block cavity size: 9.5 mm.
- .2 For 159 mm and larger block cavity size: 19 mm.

.3 Where not otherwise specified, concrete slump shall be 127 to 178 mm.

.4 Reinforcing steel shall be as specified under Section 03 20 00, and as indicated on the reviewed and a accepted shop drawings.

2.4 WALL ALIGNMENT SYSTEM

.1 The Wall Alignment System shall be used as a wall bracing system, and consist of an adjustable mechanism to ensure, and maintain, plumbness of the wall during construction.

.2 The wall alignment system shall be assembled in accordance with the reviewed and accepted shop drawings and designed to handle all design construction loads. Installation of ICF shall comply with ACI 347.2R.

.3 Assembly of the wall alignment system must comply with local building and regulatory codes.

2.5 AIR/MOISTURE BARRIER

.1 Refer to Section 07 27 26 "Fluid-Applied Air/Moisture Barrier".

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 Verify:
- .1 Footings installed under Section 03 30 00 are within $\pm$ 6 mm of level and that steps in footings are 406 mm in height;
- .2 Reinforcing steel dowels are in place at centres along footing lengths indicated on the drawings.

.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 Ensure top of footings are clear of debris prior to installing ICF. All debris must be removed from the interior of the forms prior to installation.

3.3 INSTALLATION

.1 Install ICF products in accordance with the manufacturer's printed installation instructions and as

directed by the Consultant. Alternative installation methods shall be approved by the Consultant in writing prior to installation.

.2 Ensure the proper installation methods for the following work are employed on site. The installation method shall comply with the manufacturer's installation instructions, unless alternate methods are approved by the Consultant.
- .1 Installation of first course
- .2 Installation of horizontal reinforcement
- .3 Setting successive courses
- .4 Forming door and window openings
- .5 ICF alignment and scaffolding system installation
- .6 Installation of vertical reinforcement
- .7 Inspection and alignment of forms prior to concrete placement
- .8 Concrete placement
- .9 ICF alignment and scaffolding system removal

3.4 SERVICE PENETRATIONS

.1 Install service penetrations where indicated and where required by other trades. Verify service penetration locations and sizes with the Construction Manager prior to installation. Service penetrations shall be installed by the appropriate trade.

.2 Where service penetrations run through the ICF wall, provide sleeves to create a void where the service is to be located. Place sleeves prior to concrete placement.

3.5 FIELD QUALITY CONTROL

.1 Inspect the erected formwork prior to placing concrete to verify, but not limited to, the following:
- .1 Conformance to Contract Documents and reviewed and accepted shop drawings;
- .2 Plumbness of wall;
- .3 Rebar placement;
- .4 Stability of wall alignment system (wall bracing system) and any additional anchoring system required to keep the walls aligned, in position and rigid.

3.6 CLEANUP

.1 Ensure work site is kept clean at all times.

.2 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 following trades.

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

3.7 PROTECTION

.1 Prior to concrete placement, protect with tape or other means the interlocking knobs along the top of the ICF wall to ensure no concrete debris sets on and between the interlocking knobs.

.2 Provide protection of installed forms if the forms are expected to be exposed to UV rays for longer than 180 days (i.e. delay in final wall finish application).

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 concrete unit masonry work, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Work:
- .1 Section 05 50 00 - Metal fabrications.
- .2 Section 06 10 00 - Rough Carpentry.
- .3 Section 07 21 00 - Building Insulation.
- .4 Section 07 92 00 - Joint Sealants.

1.3 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet, and Strip.
- .3 ASTM C67-14, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
- .4 ASTM C73-10, Standard Specification for Calcium Silicate Brick (Sand-Lime Brick).
- .5 ASTM C97/C97M-09, Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.
- .6 ASTM C99/C99M-09, Standard Test Method for Modulus of Rupture of Dimension Stone.
- .7 ASTM C144-11, Standard Specification for Aggregate for Masonry Mortar.
- .8 ASTM C170/C170M-14a, Standard Test Method for Compressive Strength of Dimension Stone.
- .9 ASTM C494/C494M-13, Standard Specification for Chemical Admixtures for Concrete.
- .10 ASTM D1056-14, Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.

.2 Canadian Standards Association (CSA):

- .1 CSA-A165-Series 14, CSA Standards on Concrete Masonry Units.
- .2 CSA-A179-14, Mortar and Grout for Unit Masonry.
- .3 CSA-A370-14, Connectors for Masonry.
- .4 CSA-A371-14, Masonry Construction for Buildings.
- .5 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
- .6 CSA-S304-14, Design of Masonry Structures.

1.4 DEFINITION

.1 "Exposed" means visible in the competed Work, painted and unpainted.

1.5 SUBMITTALS

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

.2 Samples of the following:
- .1 Three stone masonry units of each type, colour and texture, representative of the range of colour and texture variation to be expected in the completed construction.
- .2 One sample of each type of masonry connector.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials to job site in dry condition.

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

.3 Keep materials dry until use.

.4 Store masonry units on elevated platforms, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not install until they are in an air-dried condition.

.5 Store cementitious materials on elevated platforms, under cover, and in a dry location.

.6 Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

.7 Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

.1 Protection of Masonry: During erection, protect laid masonry from damage by weather. Cover partially completed masonry when construction is not in progress.
- .1 At the end of each day's work or at the beginning of a shutdown period, cover tops of walls, projections, and sills with canvas or strong waterproof membrane, securely clamped down and overhanging each side of the wall at least 600 mm.
- .2 Use wire spring clamps extending 200 mm down each side of the wall, spaced at 2400 mm o.c. or other method acceptable to the Consultant.

.2 Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry. Immediately remove grout, mortar, and soil that come in contact with such masonry.
- .1 Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
- .2 Protect sills, ledges, and projections from mortar droppings.
- .3 Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
- .4 Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.

.3 Cold-Weather Requirements:
- .1 Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds.
- .2 Remove and replace unit masonry damaged by frost or freezing conditions.
- .3 Use approved smokeless heaters. Do not use scorched sand.
- .4 Do not use salts, admixtures, or antifreezes.
- .5 Comply with the following requirements:

Air Temperature	Heating of Materials	Protection
Above 5°C	Normal masonry procedures	Cover walls and materials
Below 5°C	Heat mixing water. Maintain mortar temperature between 5°C and 30°C until placed.	Cover walls and materials to prevent wetting and freezing.
Below 0°C	In addition to above, heat sand. Thaw frozen sand and frozen wet masonry units before use.	With wind velocities over 35 kph, provide windbreaks during the work day and cover walls and materials at the end of each work day to prevent wetting and freezing. Maintain masonry above 0°C by using auxiliary heat or insulated blankets for 16 h after laying masonry units.
Below -6°C	In addition to above, heat dry masonry units.	Provide enclosure and supply sufficient heat to maintain masonry enclosure above 0°C for 24 h after laying masonry.

.4 Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 38°C and above.

1.8 PROTECTION

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

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

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

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MASONRY UNITS

.1 Normal weight concrete masonry units to CSA-A165, H/15/A/M, as follows:
- .1 Size: metric modular 190 mm high x 390 mm long x 140 mm thick. Provide special sizes and shapes where necessary. Include purpose-made shapes for lintels.
- .2 Strength: 15 MPa on net area.
- .3 Fire ratings: Provide concrete blocks having void to solid ratios and concrete types as necessary to achieve required fire ratings for thicknesses of fire rated walls indicated.
- .4 Exposed masonry units shall be free from all surface indentations, surface cracks and other defects detrimental to the appearance of the finished surface. Block having visual defects will be rejected for exposed areas but may be used for concealed or unfinished areas.

.2 Simulated stone masonry units: Masonry units manufactured from calcium silicate containing no Portland cement, pressure-formed and autoclave-cured, to ASTM C73, severe-weathering classification, as follows:

.1 Typical physical properties:

Property	Test Method	Average Result
Compressive Strength	CSA-A82 / ASTM C67/C67M	59 MPa
	ASTM C170/C170M	45.5 MPa
Absorption	ASTM C97/C97M	8.8%
Density	ASTM C97/C97M	2070 kg/m^3
Modulus of Rupture	ASTM C99/C99M	5.3 MPa
Freeze-Thaw Durability	CSA-A82 / ASTM C67/C67M	Condition excellent No observable distress

.2 Simulated stone unit type, colour and sizes to be selected by the Consultant.

2.2 MORTAR

.1 For exposed masonry, use the same brand of mortar and source of aggregate for entire project to

ensure uniformity of colouration and other mix characteristics. Ensure mix and colour consistency from day to day.

.2 Masonry Cement, where not otherwise specified: Premixed, masonry cement, Type based on proportion specifications of CSA A179 as specified. Provide non-staining "white" cement where required to achieve selected colour.

.3 Mortar Colour Pigment: Pure synthetic, inorganic, iron oxide coloured mortar pigment. Standard of acceptance: "Extra Strong Mortar Colour" by Harcos Pigments Canada. Colour to be selected by the Consultant from the manufacturer's complete colour range.

.4 Aggregate for Mortar: Sand to ASTM C144, graded with 100% passing No.16 (1.18 mm) sieve

.5 Admixtures: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless specified or specifically approved in writing by the Consultant. Do not use calcium chloride in mortar or grout.

.6 Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by the manufacturer for use in masonry mortar of the specified composition. Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, in order to ensure that mortar colour is consistent.

.7 Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units containing integral water repellent by the same manufacturer.

.8 Water: Potable.

2.3 MORTAR MIXES

.1 Mix mortar materials under strict supervision and in small batches for immediate use only. Discard mortar which has not been used before initial set has taken place. Do not use retempered mortars.

.2 Mix proprietary mortars in strict accordance with CSA-A179.

.3 Provide the following mixes, based on property specifications except where otherwise specified:

[see next page]

Location/Application	Type	28-Day Strength	Description
Bedding lintels	M	17.5 MPa (2,500 psi)	
Masonry below grade and in contact with earth.	S	8.5 MPa (1,200 psi)	
Exterior masonry veneer applications	N	3.5 MPa (500 psi)	1:1:6 proprietary, pre-mixed, pre-coloured Portland cement / lime mortar.
All other locations/ applications	N	3.5 MPa (500 psi)	

.4 Coloured mortar: Mix coloured mortar in strict accordance with the mortar colour pigment manufacturer's written instructions. Under no circumstances shall the mortar colour pigment exceed 10% of the mix.

2.4 GROUT

.1 Grout for Unit Masonry: To CSA A179. Mix grout of consistency indicated or, if not otherwise indicated, of consistency (fine or coarse) at time of placement that will completely fill spaces intended to receive grout.
- .1 Use fine grout in grout spaces less than 50 mm in horizontal dimension, unless otherwise indicated.
- .2 Use coarse grout in grout spaces 50 mm or more in least horizontal dimension, unless otherwise indicated.

.2 Minimum compressive strength at 28 days: 15 MPa

.3 Slump: 75 mm.

2.5 REINFORCEMENT, ANCHORS AND TIES

.1 General: Ties and anchors conform to CSA-A370 and reinforcement shall conform to CSA-A371, galvanized finish.

.2 Standard of acceptance: Products manufactured by Blok-Lok or Dur-O-Wal.

.3 Reinforcement:
- .1 Bar: To CSA-A371 and CSA-G30.18, Grade 400W.
- .2 Truss: To CSA-A371, truss type, flush welded, prefabricated corners and tees, tabs to receive adjustable ties for masonry veneer with concrete masonry back-up.

.4 Bolts and anchors: to CSA-A371 and CSA-S304.

.5 Masonry veneer ties:
- .1 For concrete masonry back-up: Adjustable ties to suit tabs in reinforcement trusses.

.2 For wood frame back-up: Stainless steel corrugated ties, 0.76 (22 ga) thick x minimum 152 mm long x 22 mm wide.

.6 Bolts and anchors: to CSA-A371 and CSA-S304.

.7 Galvanizing (where not otherwise specified):
.1 Interior Locations: Mill galvanized, minimum 136 g/m^2 zinc coating weight.
.2 Exterior locations: Hot-dipped galvanized to ASTM A123, minimum 400 g/m^2 zinc coating weight

2.6 PACKING INSULATION

.1 Loose rockwool insulation to CAN/CGSB-51.11, minimum 16 kg/m^3 density.

2.7 FLASHING

.1 Flexible Masonry Flashing: SBS modified bitumen membrane, reinforced with proprietary glass scrim.
.1 Thickness: 1.2 mm.
.2 Standard of acceptance: Blueskin AG by Monsey-Bakor Inc., (514) 364-1991.

.2 Flexible Masonry Flashing Adhesive: Synthetic rubber, solvent base, trowel consistency type adhesive as recommended by the flexible flashing manufacturer. Standard of acceptance: Air-Bloc 21 by Monsey-Bakor Inc.

.3 Primers, cleaners and adhesives as recommended by membrane manufacturer.

.4 Metal Drip Flashings: Minimum 0.76 mm (22 ga) austenitic stainless steel sheet to ASTM A666, Type 304, soft, with type 2B/2D rolled, (unpolished) finish. Standard of acceptance: "S.S. Flashing" by Dur-O-Wal Inc., (905) 670-4470.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

.1 Soft joint filler and airspace compartmentalization seal:
.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.

.2 Weepholes/Vents: Purpose-made PVC weephole/ventilator, T-shape, for building into the wall in vertical joint between adjacent masonry units. Standard of acceptance: "Goodco" brick vent by Goodco Ltd.

.3 Control joint filler: Purpose made, preformed expansion joint, 10 mm thick x width to suit masonry,

closed cell neoprene to ASTM D1056, class RE41 or 2A1, compressibility > 50%. Standard of acceptance: Rapid Soft-Joint/Expansion Joint by Dur-O-Wal Ltd.

.4 Mortar Dropping Control Device: High density polyethylene or nylon woven mesh type mortar dropping control device with trapezoidal "zig-zag" shaped top edge, designed to allow moisture to drain downward in cavity to the weepholes; thicknesses to suit cavity widths. Standard of acceptance: "The Mortar Net" by Mortar Net USA Ltd., distributed by J.V. Building Supply.

.5 Sealant and sealant accessories: Refer to Section 07 92 00 "Joint Sealants".

Part 3 Execution

3.1 EXAMINATION

.1 Examine conditions, with the installer present, for compliance with requirements for installation tolerances and other conditions affecting the performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.

.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 masonry work 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 Do masonry work in accordance with CAN3-A371 except where specified otherwise.

.2 Build masonry plumb, level, and true to line, with joints staggered in alternate courses alternate vertical joints in vertical alignment. Maintain specified tolerances.

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

.4 Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting, where possible. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

.5 Cut masonry for flush-mounted electrical outlets, grilles, pipes, conduit, and other recessed or penetrating items. Leave maximum 3 mm clearance.

.6 Keep exposed faces free from stains, chips and cracks. Remove chipped, cracked, and otherwise deformed units and replace with undamaged units.

.7 Make vertical and horizontal joints 10 mm thick, except where otherwise indicated or specified. Fill all joints solidly with mortar except where specifically designated to be left open.

.8 Buttering corners of units, throwing mortar droppings into joints will not be permitted. Do not shift or tap units after mortar has taken initial set. Where adjustment must be made after the mortar has started to set, remove mortar and replace with fresh supply.

.9 Build chases and recesses to accommodate items specified in this and other Sections of the Specifications.

.10 Leave openings for equipment to be installed before completion of masonry. After installing equipment, complete masonry to match construction immediately adjacent to the opening.

.11 Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colours and textures and to avoid abrupt colour/texture changes, patches, and streaks and to produce a homogeneous blended appearance. Do not install units that are too contrasting to produce a satisfactory blend. If varying colours and textures are not blended to the Consultant's satisfaction, remove and replace the offending units at no additional cost to the Contract.

3.3 CONSTRUCTION TOLERANCES

.1 Variation from Plumb:
- .1 For vertical lines and surfaces of columns, walls, and arises, do not exceed 6 mm in 3 m, nor 10 mm in 6 m, nor 12 mm in 12 m.
- .2 For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4" in 20'-0" (6 mm in 6 m), nor 1/2" in 40'-0" (12 mm in 12 m) or more.
- .3 For vertical alignment of head joints, do not exceed plus or minus 6 mm in 3 m, nor 12 mm maximum.

.2 Variation from Level:
- .1 For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 6 mm in 6 m, nor 12 mm in 12 m or more.
- .2 For top surface of bearing walls, do not exceed 3 mm in 3 m, nor 1.5 mm within width of a single unit.

.3 Variation of Linear Building Line: For position shown in plan and related portion of columns, walls, and partitions, do not exceed 12 mm in 6 m, nor 19 mm in 12 m.

.4 Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 6 mm nor plus 12 mm.

3.4 LAYING MASONRY WALLS

.1 Do not wet concrete masonry units before or during laying.

.2 Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

.3 Lay walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

.4 Provide special shapes as required, such as halves, jambs, corners, and other required special shapes.

.5 Bond Pattern for Exposed Masonry: Generally, lay exposed masonry in running bond with joints in consecutive courses offset no less than 100 mm. Do not use units with less than nominal 100-mm horizontal face dimensions at corners or jambs. Provide special courses and patterns as indicated.

.6 Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond; do not tooth. Clean exposed surfaces of set masonry, and remove loose masonry units and mortar prior to laying fresh masonry.

.7 Built-in Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

3.5 MORTAR BEDDING AND JOINTING

.1 Lay masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not furrow bed joints or slush head joints.

.2 In concrete blockwork, use full bed of mortar for first course. Bed face shells and cross and end web fully in mortar.

.3 At masonry veneer, slope beds toward airspace to minimize mortar protrusions into airspace. As work progresses, trowel mortar fins protruding into airspace flat against airspace face of masonry.

.4 In exposed masonry work, use concave joints. Allow joints to set just enough to remove excess water and, when mortar is "thumbprint" hard, tool with round jointer to provide smooth, compressed, uniformly concave joints.

.5 Strike flush all joints concealed in walls and joints in walls to receive tile, insulation, or other applied material, except that where paint or similar thin finish coating is called for, use concave joints as specified for exposed work.

3.6 AIRSPACE

.1 Keep airspace clean of mortar droppings and other materials during construction. Strike flush joints facing airspace. After the first course of masonry is laid, install a continuous row of mortar dropping control device in the airspace, on though-wall flashing, against the inside of the masonry veneer, with the trapezoidal "zigzag" shaped edge in top position and the high points of the "zigzag" aligned with the weepholes, as recommended by the mortar dropping control device manufacturer.

.2 Compartmentalize the airspace by installing a soft joint filler to form a continuous vertical seal at each change of direction of the building face.

3.7 ANCHORAGE AND TYING

.1 Tie masonry veneer to backing to resist all lateral forces in accordance with OBC, Part 4 requirements.

.2 Provide lateral support and anchorage as scheduled.

.3 Space connectors to OBC requirements. Install additional connectors within 300 mm of openings and at intervals around perimeter of openings not exceeding 200 mm.

.4 Embed ties solidly in mortar to develop maximum resistance to design forces.

3.8 CONTROL AND EXPANSION JOINTS

.1 General: Install control and expansion joints in unit masonry where indicated. Build-in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall movement.

.2 Control joints in masonry veneer: Use specified soft-joint/expansion joint material and apply sealant in accordance with Section 07 92 00 "Joint Sealants".

3.9 LINTELS

.1 Install steel lintels where indicated. Provide minimum bearing of 150 mm at each jamb, unless otherwise indicated.

3.10 FLASHING, WEEPHOLES, AND VENTS

.1 Install flexible flashings in accordance with the manufacturer's instructions and where shown on or reasonably implied by the drawings or required by good practice.

.2 Include a through-wall flashing to bridge the airspace at each floor level, as indicated.

.3 In veneered walls, carry flashings from front edge of masonry, under the veneer, then up backing not less than 200 mm.

.4 Design through-wall flashings with a profile which will divert water to the outside of the wall. Extend flashing membrane slightly beyond the exterior face of the masonry and neatly trim. Do not caulk at the outside face of the wall.

.5 Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer before covering with mortar.

.6 Install weephole/ventilators to perform as weepholes in the head joints of the first course of masonry immediately above embedded flashing. Space weep holes 800 mm o.c. Keep weepholes free of mortar droppings and other foreign materials.

.7 Install weephole/ventilators to perform as ventilators in vertical head joints at the top of each continuous airspace compartment. Space vents at 800 mm o.c., staggered in relation to weepholes above. Close off airspaces vertically and horizontally with blocking in the manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

.8 Install reglets and nailers for flashing and other related construction where shown to be built into masonry.

3.11 FIELD QUALITY CONTROL

.1 The Construction Manager will appoint a qualified independent testing agency to perform testing for field quality control. The cost of initial inspection and testing will be paid by the Owner. The cost of reinspection and retesting required as a result of failure to meet specified requirements on the initial inspection/test shall be paid by the Trade Contractor.

.2 If requested, the Trade Contractor shall remove a portion of the masonry veneer/exterior wythe (approximately 1 m^2) for inspection of the cavity. Up to four (4) such inspections may be conducted. The Consultant reserves the right to require additional inspections, at no additional cost to the Contract, if the initial inspections indicate unsatisfactory workmanship.

.3 Evaluation of Quality-Control Tests: In the absence of other indications of noncompliance with requirements, masonry will be considered satisfactory if results from construction quality-control tests comply with minimum requirements indicated.

3.12 REPAIRING, POINTING, AND CLEANING

.1 Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units; install in fresh mortar or grout, pointed to eliminate evidence of replacement.

.2 Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants.

.3 In-Progress Cleaning: Allow mortar droppings on masonry surfaces to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block and finally by brushing. DO NOT PERMIT MORTAR DROPPINGS ON MASONRY SURFACES TO BECOME HARD BEFORE CLEANING. CLEAN WITHIN MAXIMUM 24 HOURS OF LAYING.

.4 Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
- .1 Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
- .2 Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain the Consultant's approval of sample cleaning before proceeding with cleaning of masonry.
- .3 Protect adjacent non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
- .4 Use only cleaning methods and materials recommended by both the masonry unit and the masonry cement manufacturers.

.5 Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.

.5 Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Performance.

END OF SECTION

INSERT STRUCTURAL STEEL SECTIONS

[by Structural Engineer]

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:
  .1 The work of this Section includes the provision of all labour, materials, equipment and services required to fabricate and install metal fabrications, as indicated on the drawings, as specified herein and as required for a complete project.
  .2 Examine the architectural, structural, mechanical and electrical drawings to establish the full extent of the work of this Section.

.2 Related Work:
  .1 Section 04 20 00 - Unit Masonry.
  .2 Section 09 91 00 - Painting.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
  .1 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  .2 ASTM A307-14 Standard Specification for Carbon Steel Bolts and Studs, 60.000 PSI Tensile Strength.
  .3 ASTM A325-14, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/125 ksi Minimum Tensile Strength.
  .4 ASTM A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian Standards Association (CSA):
  .1 CSA-G40.20-04/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  .2 CSA-S16-14, Design of Steel Structures.
  .3 CSA-W59-13, Welded Steel Construction (Metal Arc Welding).

.3 Master Painters Institute (MPI):
  .1 MPI Architectural Specification Manual, 2014 (referred to herein as "MPI Manual")
  .2 MPI Approved Product List, (referred to herein as "APL")

.4 Steel Structures Painting Council (SSPC):
  .1 SSPC-S.P.6-85, Surface Preparation Standard, Commercial Blast Cleaning.

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 Shop Drawings:
- .1 Clearly indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
- .2 Items where structural failure could represent a safety hazard, including all related connections and fastenings, shall be designed by a structural engineer permanently licensed to practice in the Province of Ontario. Each shop drawing submitted shall bear the stamp and signature of the aforesaid structural engineer.

.3 Source Quality Control:
- .1 If requested by the Consultant, submit laboratory test reports in accordance with Section 01 45 00 "Quality Control".
- .2 Laboratory test reports shall certify compliance of materials with specification requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MATERIALS

.1 Steel sections and plates: to CAN/CSA-G40.21, Grade 300W.

.2 Steel pipe: to ASTM A53, standard weight, schedule 40, seamless, black for interior work, galvanized for exterior work.

.3 Welding materials: to CSA-W59.

.4 Bolts and anchorbolts: to ASTM A307.

.5 High strength bolts: to ASTM A325M.

.6 Shop coat primer:
- .1 For interior steel surfaces: MPI APL #76 or #79, at the option of the fabricator.
- .2 For exterior steel surfaces: MPI APL #79.
- .3 Touch-up primer for galvanized surfaces: Zinc-rich primer, APL #19

.7 Grout: non-shrink, non-metallic, flowable, 24h, MPa 15, pull-out strength 7.9 MPa.

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Fabricate items from steel unless otherwise noted.

.3 Exposed surfaces of finished steelwork to be machined and/or filled to a smooth blemish-free surface, prior to prime coating. File and grind exposed welds smooth and flush. Grind off weld-splatter.

.4 Connections:
- .1 Use welded connections for all metal work unless otherwise approved by the Consultant or unless otherwise indicated on the drawings.
- .2 Where welded connections are not used, use bolted connections unless otherwise indicated.
- .3 Use screws only where indicated or only with the approval of the Consultant. Where assembly by screws is indicated, use self-tapping, flat headed, shake-proof screws.

.5 Where possible, fit and shop assemble work, ready for erection.

.6 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush. Seal exterior steel fabrications to provide corrosion protection in accordance with CAN/CSA-S16.

2.3 SHOP PAINTING

.1 Preparation of Non-Galvanized Steelwork:
- .1 Clean, prepare surface and shop prime steel to CAN/CSA-S16. Thoroughly de-scale steelwork; remove roughness and irregularities; clean with a wire brush; remove oil and grease.
- .2 Primer Application:
  - .1 Except where specified otherwise, apply one coat of primer to non-galvanized surfaces.
  - .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7^{o}C.
  - .3 Take special care when applying primer to prepared surfaces of steelwork to be exposed in the finished installation to obtain a smooth surface capable of allowing a high-quality paint finish. Do additional filling and grinding if required.
  - .4 Field touch-up: Verify that surfaces to be touched up are free from rust, scale, grease. Touch up with same material as shop primer.
  - .5 Finish painting is specified in Section 09 91 00 "Painting".

.2 Do not prime the following surfaces:
- .1 Steel to be encased in concrete;
- .2 Galvanized or non-ferrous metals;
- .3 Surfaces and edges to be field welded. If painted, remove paint for field welding for a distance of at least 50 mm in all sides of the paint.

2.4 GALVANIZING

.1 Where galvanized finish is specified, hot dip galvanize steel surfaces after fabrication to ASTM A123, minimum 600 g/m^2 coating thickness.

2.5 MISCELLANEOUS METALWORK

.1 Examine architectural, structural, mechanical and electrical drawings and specifications and furnish all miscellaneous metalwork items required for proper execution of project, including, but not necessarily limited to, the items described herein.

.2 Supply for installation by respective trades, steel brackets, supports and angles as indicated. Drill for countersunk screws and anchor bolts. Prime paint for interior installation, galvanize for exterior installations.

.3 Provide all accessories necessary for proper installation and correlation with adjoining work.

2.6 COORDINATION

.1 Coordinate the work of this Section with the structural steelwork supplier to ensure that all structural steelwork and metal fabrications required for a complete project are included.

.2 Be advised that claims for extras to the Contract Sum for the supply and/or installation of structural steelwork or metal fabrications arising from failure to coordinate the work of this Section with the structural steelwork supplier will not be considered.

.3 Where the work of this Section is furnished for installation by other Sections, coordinate with the appropriate Sections to ensure a proper fit and to schedule delivery dates to ensure the expeditious completion of the project.

2.7 FLOOR PIT AND TRENCH FRAMES AND COVERS

.1 Refer to architectural, structural and mechanical drawings.

.2 Fabricate solid and grating covers to sizes as indicated, and as required, c/w perimeter frames and anchor bolts for casting into concrete.

.3 Steelwork to be hot dipped galvanized after fabrication for paint finish by Section 09 91 00.

2.8 LOOSE LINTELS

.1 Check Architectural, Structural, Mechanical and Electrical drawings for openings or recesses in non-loadbearing walls requiring lintels. Where not otherwise specified or indicated on the structural drawings, fabricate mild steel angle lintels (one angle for each 100 mm of wall thickness) to sizes as follows:
   .1 Up to 1200 mm span: L90 x 90 x 8.
   .2 Up to 1800 mm span: L100 x 90 x 8 (LLV).
   .3 Up to 1900 mm span: L125 x 90 x 8 (LLV).

.4 Up to 2400 mm span: L125 x 90 x 8 (LLV).

.2 All lintels in bearing walls are indicated on the Structural Drawings.

.3 Weld double angles at max. 450 o.c.

.4 Provide loose lintels for installation under Section 04 20 00 "Unit Masonry".

.5 Fixed lintels and loose lintels above openings wider than 2400 mm: Refer to Structural Drawings.

.6 Interior lintels to be shop prime coated as specified herein for paint finish by Section 09 91 00. Exterior lintels to be hot-dip galvanized after fabrication for paint finish by Section 09 91 10.

2.9 ACCESS LADDERS

.1 Fabricate access ladders as indicated and as follows:
- .1 Stringers: 65 mm x 10 mm thick steel bar, drilled to receive 20 mm diameter rungs.
- .2 Rungs: 20 mm diameter steel rod, welded to stringers at 300 mm o.c.
- .3 Brackets:
  - .1 75 mm x 200 mm angle straps, welded to stringers at maximum 1200 mm o.c., c/w fixing anchors and fasteners.
  - .2 Provide 150 mm clearance between centreline of rungs and face of wall.
  - .3 Where not otherwise indicated, provide each stringer with a fixing bracket within 300 mm of each end.
  - .4 Weld brackets to stringers in continuous runs; tack welds are not acceptable.
- .4 Finish: Interior ladders to be shop primed for paint finish by Section 09 91 00 "Painting"; exterior ladders to be hot-dip galvanized after fabrication.

2.10 PIPE RAILINGS

.1 Fabricate steel pipe railings as indicated and as required. Include stair handrails and guards, miscellaneous guards to protect equipment, other railings as indicated and as required for a complete project.

.2 Steel pipe: nominal outside diameters as indicated on the drawings, formed to shapes and sizes as indicated.

.3 Cap exposed ends of pipe railings.

.4 Terminate at abutting walls with ends flanges.

.5 Design railings to conform to the requirements of OBC 2006, latest edition, and fabricate in accordance with theee reviewed an accepted shop drawings.

.6 Railings to be shop prime coated for paint finish by Section 09 91 00 "Painting".

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 ERECTION

.1 Except where otherwise indicated, install all metal fabrications.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage, acceptable to the Engineer, such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Make field connections with bolts to CAN/CSA S16 or weld.

.5 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.6 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.7 Touch-up galvanized surfaces with zinc primer where burned by field welding.

3.3 METALWORK INTEGRATED INTO THE WORK OF OTHER SECTIONS

.1 Coordinate with the appropriate other Sections, work which is to be integrated into the work of those Sections.

.2 Where appropriate, fabricate the work of this Section and hand over to others for installation.

3.4 FLOOR PIT AND TRENCH FRAMES AND COVERS

.1 Provide pit and trench frames for casting into concrete.

.2 Install soil and grating covers as applicable.

3.5 ACCESS LADDERS

.1 Install access ladders where indicatred.

.2 Fasten securely to building structure.

3.6 METAL FABRICATIONS FOR OVERHEAD DOORS

.1 Install steel channel frames, threshold and miscellaneous steel fabrications, as indicated on the reviewed metal fabrications and overhead door shop drawings.

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, and all documents referenced herein 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 metal stairs, 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 05 50 00 - Metal Fabrications.
- .3 Section 09 91 00 - Painting.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- .2 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .3 ASTM A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .4 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60.000 PSI Tensile Strength.
- .5 ASTM A307-10, Standard Specification for Carbon Steel Bolts and Studs, 60.000 PSI Tensile Strength.
- .6 ASTM A325-14, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/125 ksi Minimum Tensile Strength.
- .7 ASTM E488/E488M-10, Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
- .8 ASTM F1554-07ae1, Standard Specification for Anchor Bolts, Steel, 35, 55, and 105 ksi Yield Strength.

.2 Canadian Standards Association (CSA):
- .1 CSA-G40.20-04/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA-S16-14, Design of Steel Structures.
- .3 CSA-W59-13, Welded Steel Construction (Metal Arc Welding).

.3 Master Painter's Institute (MPI):
- .1 MPI Approved Products List (referred to herein as "APL").

.4 National Association of Architectural Metal Manufacturers (NAAMA):
.1 NAAMM AMP 510-92, Metal Stairs Manual.

.5 Steel Structures Painting Council (SSPC):
.1 SSPC-S.P.3-82, Surface Preparation Standard, Power Tools.

1.4 DESIGN CRITERIA

.1 Design metal stair, balustrade and landing construction and connections to the vertical and horizontal live load requirements and dimensional requirements of the OBC.

.2 Detail and fabricate stairs to "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM "Metal Stair Manual"

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 construction details, sizes of steel sections and thickness of steel sheet.
.2 Show sections and plans of stairs, dimensions and assembly of components:
.1 Stringers
.2 Treads
.3 Nosings
.4 Risers
.5 Headers
.6 Platforms
.7 Railings
.8 Handrails, guards and guardrails.
.9 Brackets
.10 Reinforcements
.11 Anchors
.12 Welded and bolted connections.
.3 Provide setting diagrams for installation of anchors, location of pockets, weld plates for attachment of stairs and rails to structure, and blocking for attachment of wall rail.
.4 Specify adequate back-up support, for anchoring handrail brackets, and coordinate with other trades to ensure provision of same.
.5 Indicate all required field dimensions.
.6 Stairs, stair handrails, guardrails and all other items where structural failure could represent a safety hazard, including all related connections and fastenings, both within the element and to the building, shall be designed by a Structural Engineer permanently licensed to practice 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 items have been installed in accordance with the shop drawings.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials, including packaging materials, in accordance with Section 01 74 21 "Waste Management and Disposal".

Part 2 Products

2.1 MATERIALS

.1 Steel sections: to CAN3-G40.21, Grade 300W.

.2 Steel plate: to CAN3-G40.21, Grade 260W.

.3 Steel pipe: to ASTM A53, standard weight, schedule 40, seamless, black for interior work, galvanized for exterior work.

.4 Welding materials: to CSA W59.

.5 Fasteners: Select fasteners for the type, grade, and class required for each application and complying with applicable standards.
- .1 Bolts and Nuts: Regular hexagon head bolts, ASTM A307, Grade A with hex nuts ASTM A563; and, where indicated, flat washers.
- .2 High strength bolts: to ASTM A325M
- .3 Anchor Bolts: ASTM F1554, Grade 30
- .4 Machine Screws: Cadmium plated steel, ASME B18.6.3
- .5 Plain Washers: Round, carbon steel, ASME B18.22.1
- .6 Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1
- .7 Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E488, conducted by a qualified independent testing agency. Material: Carbon-steel components zinc-plated to comply with ASTM A123, minimum 400 g/m^2 zinc coating weight.

.6 Shop coat primer: MPI APL # 76 or 79.

.7 Grout: non-shrink, non-metallic, flowable, 24h, MPa 15, pull-out strength 7.9 MPa.

.8 Glazing compound: as recommended by the fabricator/installer.

.9 Concrete fill: As specified in Section 03 30 00 "Cast-In-Place Concrete".

.10 Nonslip nosing inserts: Purpose-made aluminum extrusions, 6 mm thick x 76 mm wide with dovetail-shaped recesses filled with a mixture of ant-slip abrasive granules in epoxy binder. Standard of acceptance:
- .1 No. AS 9511 by Masons Supply Co.; or
- .2 No. 231A by Amstep Products.

2.2 FABRICATION

.1 Verify dimensions on site before commencing fabrication.

.2 Construct stairs to conform to sizes and arrangements indicated. Join pieces together by welding, unless otherwise indicated. Provide complete stair assemblies, including metal framing, hangers, columns, railings newels, balusters, struts, clips, brackets, bearing plates, and other components necessary for the support of stairs and platforms, and as required to anchor and contain the stairs on the supporting structure.

.3 Fabricate stairs, handrails and guards to conform to OBC requirements and to NAAMM minimum standards for construction, proportions and dimensions of fixed metal stairs.

.4 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.5 Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

.6 Shear and punch metals cleanly and accurately.

.7 Remove sharp or rough areas on exposed surfaces.

.8 Ease exposed edges to a radius of approximately 1 mm, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

.9 Weld corners and seams continuously to comply with the following:
- .1 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- .2 Obtain fusion without undercut or overlap.
- .3 Remove welding flux immediately.
- .4 At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and welded surface matches contours of adjoining surfaces.

.10 Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts. Locate joints where least conspicuous.

.11 Shop Assembly: Preassemble in shop to greatest extent possible to minimize field splicing and assembly. Use connections that maintain structural value of joined pieces. Clearly mark units for field assembly and coordinated installation.

.12 Provide protection against galvanic action between dissimilar metals.

2.3 STEEL PAN STAIRS

.1 Design and fabricate the entire stair and landing assembly to be self supporting off the floors, independently of the enclosing walls.

.2 Fabricate stairs with closed riser steel pan construction for concrete fill and ceramic tile finish, as indicated. For tile finish refer to Section 09 30 13 "Ceramic Tile".

.3 Form stringers from steel channels, boxed with minimum 5 mm thick plate welded onto outside wherever exposed to sight.

.4 Close ends of stringers where exposed to sight and where indicated.

.5 Form landings from steel pans supported on perimeter steel channels (stringers extended around landing) and filled with concrete. Provide steel angles at perimeter of landing, in accordance with the reviewed and accepted shop drawings.

2.4 BALUSTRADES AND GUARDS

.1 Construct balustrades and handrails from steel pipe, as indicated.

.2 Cap exposed ends of balusters and handrails.

.3 Terminate at abutting wall as indicated.

.4 Design the balusters, handrails and guards to conform to OBC requirements.

2.5 FINISHES

.1 Shop Painting for Interior Steel Surfaces:
- .1 Surface preparation: Clean, prepare surface and shop prime steel to CAN/CSA-S16.1. Thoroughly de-scale steelwork; remove roughness and irregularities; clean with a wire brush; remove oil and grease.
- .2 Primer Application:
  - .1 Apply one coat of primer.
  - .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7ºC.
  - .3 Take special care when applying primer to prepared surfaces of steelwork to be exposed in the finished installation to obtain a smooth surface capable of allowing a high-quality paint finish. Do additional filling and grinding if required.
  - .4 Field touch-up: Verify that surfaces to be touched up are free from rust, scale, grease. Touch up with same material as shop primer.
  - .5 Finish painting is specified in Section 09 91 00 "Painting".
- .3 Do not prime the following surfaces:
  - .1 Steel to be encased in concrete;
  - .2 Galvanized or non-ferrous metals;
  - .3 Surfaces and edges to be field welded. If painted, remove paint for field welding for a distance of at least 50 mm in all sides of the paint.

Part 3 Execution

3.1 PREPARATION

.1 Provide anchor bolts, bolts and plates for connecting stairs to structure.

.2 Hand items over for casting into concrete or building into masonry to the appropriate trades together with setting templates.

3.2 EXAMINATION

.1 Examine areas and conditions under which work is to be performed and verify that structural framing, enclosures, weld plates, blocking, size and location of pockets are as called for in the Contract Documents and reviewed shop drawings. Notify the Consultant 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.

3.3 HANDLING

.1 Load, unload and handle materials in a manner that will not strain, deform bend or otherwise damage it.

3.4 INSTALLATION

.1 Install plumb, straight, true to line and level, in exact locations, using welded connections wherever possible, to provide rigid structure.

.2 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

.3 Install handrails, guards and balustrades as indicated. Coordinate with Section 05 73 13 "Glazed Decorative Metal Railings" for main stairs.

.4 Install plumb, straight, true to line and level, in exact locations, using welded connections wherever possible, to provide a rigid structure in conformity with OBC dimensional and structural requirements.

.5 Provide neatly fitted joints and intersections. Fill minor imperfections with body filler and grind and sand to a smooth surface.

.6 Fill stair tread and landing pans with concrete in accordance with Section 03 30 00 "Cast-in-Place Concrete". Finish concrete surface with sealer/hardener as specified in Section 03 35 00 "Concrete Finishing" and include two strips of nonslip insert at each nosing.

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 and ready for painting by Section 09 91 00 "Painting".

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

.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, including General and Supplementary Conditions 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 a glazed aluminum railing systems, as indicated on the drawings, as specified herein and as required for a complete project.
  .2 The work includes:
    .1 A glazed aluminum guard rail to the balcony on the south side of the building.
    .2 A glazed aluminum guard rail to the stair and ramp on the west side of the building.

1.3 REFERENCE STANDARDS

.1 American Architectural Manufacturers Association (AAMA):
  .1 AAMA 2603-02, Voluntary Specifiecation, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.

.2 American Society for Testing and Materials (ASTM):
  .1 ASTM A276-13a, Standard Specification for Stainless Steel Bars and Shapes.
  .2 ASTM B209-10, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  .3 ASTM B221-13, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
  .4 ASTM E935-13, Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.

.3 Canadian Standards Association (CSA):
  .1 CSA-S157-05/S157.1-05(R2010), Strength Design in Aluminum / Commentary on CSA S157-05, Strength Design in Aluminum.
  .2 CSA-W47.2-11, Certification of Companies for Fusion Welding of Aluminum.
  .3 CSA-W59.2-M1991(R2008), Welded Aluminum Construction.

.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 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 work of this Section shall be executed by a company licensed by the system 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 Clearly indicate shop details, cuts, copes, connections, holes, threaded fasteners, rivets and welds. Indicate welds using welding symbols to CSA W59.2.
- .2 Include the type, size, spacing of plates and anchors and other fitments.
- .3 Include erection details, methods, sequences of erection and type of erection equipment.
- .4 The railing system, 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 Samples: Submit a mock-up sample of the railing section for review prior to fabrication.

.4 Product Data:
- .1 Provide product data for the following:
  - .1 Manufacturer's product line of mechanically connected handrails and railings.
  - .2 Grout, anchoring cement, and paint products.
- .2 Include installation instructions for the handrail and railing system

.5 Test Reports:
- .1 Submit a copy of mill reports covering chemical and physical properties of materials used on this project, certified by the fabricator.
- .2 Submit results of specified load test reports.
- .3 Submit design calculations and/or test results verifying conformance with the specifications and applicable regulations, codes and bylaws.

.6 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.

.7 Maintenance Data:
- .1 Provide maintenance data for the handrail and railing system for incorporation into the manual specified in Section 01 78 23.
- .2 Include the manufacturer's recommendations for periodic safety inspection.

1.6 DESIGN AND PERFORMANCE REQUIREMENTS

.1 Design and construct the railing system to OBC 2012 requirements and the requirements of all authorities having jurisdiction.

.2 Conform to the requirements of ASTM E985 verified by testing in accordance with ASTM E935.

.3 Do aluminum welding work to CSA-W59.2.

.4 Provide handrails and railings capable of withstanding structural loads required by OBC 2012 without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections.

.5 Base structural design on CAN3-S157.

.6 In the presence of the Consultant, conduct testing for static loads and deflection in accordance with CAN3-S157, ASTM E935 and ASTM E985.
- .1 Load Criteria: The installed railing system shall withstand all loads in accordance with the requirements of OBC 2012, multiplied by factor 1.875.
- .2 Deflection Criteria:
  - .1 For horizontal load at mid-span of rail d max = h/24 + 1/96 or 57 mm whichever is less.
    - .1 h = height of railing post.
    - .2 l = span of top rail between vertical supports.
  - .2 For horizontal load at top of post d max = h/24.
  - .3 Residual deflection at the released test load, that is 50% of the preload, d max = 20% of the deflection permitted or 11.4 mm whichever is less for factored load (residual deflection d= 0 for unfactored load).

.7 Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, over stressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss. Temperature Change (range): 67°C, ambient; 100°C, material surfaces.

.8 Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.7 DELIVERY, STORAGE AND HANDLING

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

.2 Store materials in a dry, well-ventilated, weathertight place, in strict accordance with the manufacturer's recommendations.

.3 Before shipment, protect railings and finish surfaces against damage, wrap or package for shipment and storage.

.4 Take all necessary precautions to ensure finished surfaces are not marred or scratched during hoisting and erection.

.5 Maintain squareness of railings during hoisting and installation.

1.8 PROJECT CONDITIONS

.1 Field Measurements: Verify railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

.2 Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating handrails and railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

.1 Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.10 SCHEDULING

.1 Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that does not satisfy structural performance requirements.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on a glazed aluminum railing system by Greco Aluminum Railings.

.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 RAILING SYSTEM DESCRIPTION

.1 Provide complete railing systems of the configurations indicated, fabricated from manufacturer's standard components.

.2 Design the guardrail with vertical railing posts at maximum 1200 mm o.c. Provide a minimum of two 16 mm dia. anchors, at each post base plate. Connect top railing to vertical posts. Adjacent to walls, at end spans connect the top railing to the wall. Design vertical posts at end spans for the full effect of the load assuming that there is no connection to the wall.

2.3 MATERIALS

.1 Aluminum:
- .1 Not less than the strength and durability properties of the following alloys and tempers:
  - .1 Extruded bars, shapes and mouldings: To ASTM B221, 6061-T6 or 6351-T6 alloy and temper.
  - .2 Plate and Sheet: To ASTM B209, 6061-T6 alloy and temper
- .2 Provide material free from surface blemishes where exposed to view in the finished assembly. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolourations or other imperfections are not acceptable.

.2 Fasteners, anchors: Stainless Steel to ASTM A276, Type 316.

.3 Welding materials for aluminum: To CSA-W59.2.

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

2.4 FABRICATION

.1 Fabricate railings in accordance with the reviewed and accepted shop drawings and to field dimensions, to the satisfaction of the authorities having jurisdiction.

.2 Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

.3 Fabricate plumb, square and true-to-line with a tolerance of 1:200 and with all joints neatly and accurately aligned and fastened and protected with sleeves.

.4 Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

.5 Provide bearing plates and anchors as required.

.6 Fabricate all components of the guardrails of similar metal. All associated hardware including shims, anchor bolts, screws, washers, nuts, etc. shall be premium grade stainless steel.

.7 The top handrail shall be a rounded profile.

.8 Equip all changes in direction of the top handrail (ie. at corners, returns etc.) with a prefabricated sleeve to splice the sections of the top handrail together. Mitring of adjacent sections of the handrail will not be accepted.

.9 Remove burrs from cut sections.

.10 Make punched or drilled holes in components clean and accurately spaced without deformation to components.

.11 Make all welds smooth and continuous without distortion or components.

.12 All welding of aluminum shall conform to CSA W59.2. Welds shall be capable of developing full strength of section.

.13 All parts shall be fabricated plumb and square within a tolerance of 0.5%.

.14 Fasteners shall be concealed except where otherwise approved by the Consultant.

.15 Design all anchor bolts to provide a minimum of 15 mm of the threads above the nut after tightening. Scour exposed threads to prevent loosening of the nuts. Coat exposed portion of anchors with clear lacquer.

2.5 FINISHES

.1 Finish exposed aluminum surfaces with thermosetting acrylic or powder coat polyester paint to colour to be selected by the Consultant. Standard of acceptance:
- .1 PPG Duracon Super 600.
- .2 Protech Chemical powder coat.

.2 Pretreat all metal components as recommended by coating manufacturer and apply coatings in strict accordance with manufacturer's printed directions.

.3 Appearance: visibly free from flaw lines, streaks, sags, blisters.

2.6 ISOLATION COATING

.1 Isolate aluminum from 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.

.2 Apply isolation coating to the underside of all base plates prior to the railing installation to isolate the aluminum from direct contact with concrete.

Part 3 Execution

3.1 GENERAL

.1 Execute the work in strict accordance with the manufacturer's instructions, and the reviewed and accepted shop drawings, to the satisfaction of the authorities having jurisdiction.

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 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.

3.3 ERECTION

.1 Install the railing system level, plumb and in true alignment and fasten securely in place.

.2 Fit exposed connections together to form tight, hairline joints.

.3 Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

.4 Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.

.5 Tolerances:
- .1 Set posts plumb within a tolerance of 2 mm in 1 m.
- .2 Align rails so variations from level for horizontal members do not exceed 5 mm in 3 m.

.6 Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.

.7 Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

3.4 CONNECTIONS

.1 Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler coloured to match finish of handrails and railings.

3.5 ANCHORING POSTS

.1 Attach posts as indicated using fittings designed and engineered for this purpose.

3.6 ANCHORING RAILING ENDS

.1 Anchor railing ends into concrete and masonry with flanges connected to railing ends and anchored into wall construction with post installed anchors and bolts.

.2 Connect flanges to railing ends using nonwelded connections.

.3 For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

3.7 FIELD CHANGES

.1 Do not field cut or alter any member, connector, or detail without prior written approval of the Consultant.

3.8 COMPLETION

.1 Do not remove erection equipment from site until installation has been inspected and accepted in writing by the Consultant.

.2 Remove or conceal trade marks or disfiguring marks on exposed aluminum surfaces. Remove and replace any defective components.

3.9 CLEANING

.1 Upon completion of the installation, remove from the premises all , 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 Make good any damage caused by the work of this Section.

3.10 FIELD TESTING AND INSPECTIONS

.1 If requested by the Construction Manager or the Consultant, provide testing of the railing anchors to verify their capacity to support the applied. The cost of initial testing will be paid by the Owner. The cost of subsequent testing required as a result of failure to comply with specified requirements on the initial test shall be paid by the Trade Contractor.

.2 Upon completion of the railing installation the Engineer responsible for the design of the railings shall provide a certification that all of the work is complete and that the entire installation has been completed in accordance with the shop drawings.

.3 Provide a report from an independent inspection and testing agency who has verified that all fasteners have been torqued in accordance with the fastener manufacturer's requirements.

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:
- .1 The work of this Section includes the provision of all labour, materials, equipment and services required to complete rough carpentry work, as indicated on the drawings, as specified herein and as required for a complete project.
- .2 The work includes rough carpentry work as required for the proper completion of the work of all trades, as required for a complete project.

.2 Related Sections:
- .1 Section 06 20 00 - Finish Carpentry.
- .2 Section 07 31 13 - Asphalt Shingles.
- .3 Section 07 52 16 - SBS Modified Bituminous Roofing.
- .4 Section 07 62 00 - Sheet Metal Flashing and Trim
- .5 Division 26 - Electrical.

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM):
- .1 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM C1177/C1177M-13, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .3 ASTM D5055-13e1, Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .2 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .3 CAN/CGSB-71.26-M88, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

.3 Canadian Standards Association (CSA International)
- .1 CSA-B111-1974(R2003), Wire Nails, Spikes and Staples.
- .2 CAN/CSA-O80-Series-08 (2012) Consolidated, Wood Preservation.
- .3 CSA-O112.9-10, Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).
- .4 CSA-O112.10-08(R2013), Evaluation of Adhesive for Structural Wood Products (Limited Moisture Exposure.
- .5 CSA-O121-08(R2013), Douglas Fir Plywood.
- .6 CSA-O141-05(R2009), Softwood Lumber.
- .7 CSA-O151-09, Canadian Softwood Plywood.

.8 CSA-O325-07(R2012), Construction Sheathing.
.9 CAN/CSA-O437-93(R2011), Standards on OSB and Waferboard.

.4 National Lumber Grades Authority (NGLA):
.1 NLGA Standard Grading Rules for Canadian Lumber, 2010.

.5 Truss Plate Institute of Canada (TPIC):
.1 TPIC Truss Design and Procedures for Light Metal Connected Wood Trusses.

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood, and wood-based composite panels in accordance with CSA and ANSI standards.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 FRAMING AND STRUCTURAL MATERIALS

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
.1 CSA O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Glued end-jointed (finger-jointed) lumber is not acceptable for this project.

.3 Prefabricated Wood I-joists in accordance with ASTM D5055.

.4 Light-frame trusses in accordance with "TPIC Truss Design and Procedures for Light Metal Connected Wood Trusses".

.5 Framing and board lumber: in accordance with OBC, Part 9.

.6 Furring, blocking, nailing strips, grounds, rough bucks, curbs, fascia backing and sleepers:
.1 S4S.
.2 Board sizes: "Standard" or better grade.
.3 Dimension sizes: "Standard" light framing or better grade.
.4 Post and timbers sizes: "Standard" or better grade.

2.2 PANEL MATERIALS

.1 Plywood and wood based composite panels: to CSA-O325.

.2 Douglas fir plywood (DFP): to CSA-O121, standard construction.

.3 Canadian softwood plywood (CSP): to CSA-O151, standard construction.

.4 OSB to CAN/CSA-O437.

.5 Gypsum sheathing: to ASTM C1177, silicone treated core and fibreglass-mat face and back, face side surfaced with heat-cured copolymer water and vapour retardent coating, thickness as indicated, square ends and edges. Standard of acceptance: Dens-Glass Gold by Georgia Pacific.

2.3 ACCESSORIES

.1 Polyethylene film: to CAN/CGSB-51.34, Type 1, 0.15 mm thick.

.2 Subflooring adhesive: to CAN/CGSB-71.26, cartridge loaded.

.3 General purpose adhesive: to CSA-O112.9 or CSA-O112.10, as appropriate to location.

.4 Nails, spikes and staples: to CSA-B111.

.5 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.6 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

.7 Joist hangers: minimum 1 mm thick sheet steel, galvanized ZF001 coating designation.

.8 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, extruded 6063-T6 aluminum alloy, type approved by the Consultant.

.9 Sheathing membrane: 100% high density polyethylene spun bonded olefin to CAN/CGSB-51.32. Standard of acceptance: Tyvek.

.10 Sheathing Tape: as recommended by the sheathing membrane manufacturer.

2.4 FASTENER FINISHES

.1 Galvanizing: to ASTM A123. Use galvanized fasteners for exterior work, interior highly humid areas pressure-preservative treated lumber.

2.5 WOOD PRESERVATIVE

.1 Pressure impregnated to CSA-O80 Series, maximum allowable VOC limit 350 g/L.

Part 3 Execution

3.1 INSTALLATION

.1 Comply with requirements of OBC 2006 Part 9 supplemented by following paragraphs.

.2 Install members true to line, levels and elevations, square and plumb.

.3 Construct continuous members from pieces of longest practical length.

.4 Install spanning members with "crown-edge" up.

.5 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

.6 Install combined subfloor and underlay with panel end-joints located on solid bearing, staggered at least 800 mm.
- .1 In addition to mechanical fasteners, floor panels secure floor subflooring to floor joists using glue. Place continuous adhesive bead in accordance with manufacturer's instructions, single-bead on each joist and double-bead on joists where panel ends butt.

.7 Install glass mat gypsum board wall sheathing in accordance with manufacturer's printed instructions:
- .1 Install yellow side facing out.
- .2 Lay out boards so that joints are centered on framing or furring members. Stagger end joints.
- .3 Cut boards to fit irregular shapes and to fit snugly around door and window openings. On curved surfaces, score boards if required to maintain curves.
- .4 Ensure that all edges are supported continuously. Provide additional furring if necessary.
- .5 Butt boards together in an easy fit.
- .6 Fasten in accordance with the manufacturer's recommendations for the specific application. Maximum fastener spacing: 200 mm o.c.
- .7 Locate fasteners no closer than 10 mm from the edges of the boards and drive firmly against and flush with the surface of the sheathing. Do not countersink.
- .8 Leave ready to receive membrane air barrier as specified in Section 07 27 10.

.8 Install OSB wall sheathing in accordance with requirements of OBC, Part 9.

.9 Install sheathing membrane over the entire area of the OSB wall sheathing:
- .1 Use sheets of the largest practical size to minimize joints.
- .2 Tape joints to ensure continuity of the air barrier.
- .3 Inspect sheets for continuity. Repair punctures and tears with tape before work is concealed.
- .4 At openings and at interface with other construction elements, prepare sheathing membrane to receive transition strips as specified in Section 07 27 10 "Membrane Air Barrier".

.10 Install plywood roof sheathing in accordance with requirements of OBC, Part 9.

.11 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding, electrical equipment mounting boards, and other work as required.

.12 Install furring to support cladding where there is no blocking and where sheathing is not suitable for direct nailing. Align and plumb faces of furring and blocking to tolerance of 1:600.

.13 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.14 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

.15 Install sleepers as indicated.

.16 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

3.2 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

3.3 SCHEDULES

.1 Roof sheathing: Plywood, DFP or CSP, sheathing grade, square edge, 13 mm thick.

.2 Exterior wall sheathing:
- .1 Back-up to EIFS: Glass mat gypsum board wall sheathing, square panel edge, 13 mm thick with air barrier membrane as specified in Section 07 27 10 "Membrane Air Barrier".
- .2 Other exterior walls: OSB, thickness as indicated, with sheathing membrane as specified herein.

.3 Combined subfloor and underlay: Plywood, DFP or CSP sheathing grade, T&G edge, 16 mm thick.

.4 Electrical equipment mounting boards: Plywood, DFP or CSP construction grade, square edge 16 mm thick.

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 finish carpentry work, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 06 10 00 - Rough Carpentry.
- .2 Section 06 41 19 - Melamine Board Casework.
- .3 Section 08 14 16 - Flush Wood Doors.
- .4 Section 08 71 10 - Door Hardware.
- .5 Section 08 71 13 - Cabinet and Miscellaneous Hardware.
- .6 Section 09 91 00 - Painting.

1.3 REFERENCES

.1 American National Standards Institute (ANSI):
- .1 ANSI A208.1-2009, Particleboard.
- .2 ANSI A208.2-2009, Medium Density Fiberboard for Interior Applications.

.2 Architectural Woodwork Manufacturers' Association of Canada (AWMAC):
- .1 Architectural Woodwork Standards, 1st. Edition, 2009 (referred to hereinafter as "AWS").

.3 American Society for Testing and Materials (ASTM):
- .1 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.4 Canadian Standards Association (CSA):
- .1 CSA-B111-1974(R2003), Wire Nails, Spikes and Staples.
- .2 CSA-O121-08(R2013), Douglas Fir Plywood.
- .3 CAN/CSA-O141-05(R2009), Softwood Lumber.
- .4 CSA-O151-09, Canadian Softwood Plywood.

.5 National Electric Manufacturers Association (NEMA):
- .1 NEMA LQ1, Decorative Boards.

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 Shop Drawings:
  .1 Indicate details of construction, profiles, jointing, fastening and other related details.
  .2 Indicate all materials, thicknesses, finishes and hardware.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

.1 Protect materials against dampness during and after delivery.

.2 Store materials in ventilated areas, protected from extreme changes of temperature or humidity.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 LUMBER MATERIAL

.1 Softwood lumber: Pine species, to AWS Section 3, Custom grade or better for exposed work, S4S, moisture content average 7%, maximum 9% for interior work. Machine stress-rated lumber is acceptable for all purposes.

.2 Hardwood lumber: Maple species to AWS Section 3, Custom grade or better for exposed work, S4S, moisture content average 7%, maximum 9% for interior work.

2.2 PANEL MATERIAL

.1 Douglas fir plywood (DFP): to CSA O121, standard construction.

.2 Medium Density Fibreboard (MDF): to ANSI 208.2., density 769 kg/m^3.

.3 Hardwood veneer panels:
  .1 Where not otherwise indicated: Maple veneer faced panels, specification as follows:
    .1 Core: Mat-formed wood particleboard: industrial grade to ANSI A208.1, density 449 k/m^3. Class A fire resistant.
    .2 Face veneers: Selected birdseye maple to QSI Section 200, Grade AA. Flitch to be selected at source by the Consultant prior to ordering. Veneers to be continuous over each panel (no horizontal seams).
    .3 Panels to be fabricated by the architectural woodwork fabricator, to the sizes and configurations indicated on the drawings. The veneer in each panel to be one piece without joints.

.4 Low-pressure decorative laminate (LPDL) panels (melamine panels): In accordance with AWS Section 4, thermally-fused decorative melamine foil laminated to rigid particleboard substrate:
  .1 Core: Mat-formed wood particleboard: industrial grade to ANSI A208.1 Grade R, density 449 k/m^3.

.2 Melamine foil finish: Minimum 120 g/m^2 weight, thermally fired to both sides of particleboard. Colours to be selected by the Consultant from the melamine manufacturer's complete colour range.

.3 Prepainted UV board or vinyl-faced board is not acceptable as a substitute for melamine panels specified herein.

.4 Edge banding for melamine panels: "Polyband" polyester edge banding, 60 gram print paper, fully impregnated with polyester resin, hot meltcoated. Colour to match melamine. Apply to all exposed edges.

2.3 ACCESSORIES

.1 Nails and staples: to CSA B111; galvanized to CAN/CSA-G164 for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.

.2 Wood screws: Electroplated steel, type and size to suit application.

.3 Adhesives: as recommended by installer.

2.4 WOOD DOOR FRAME FABRICATION

.1 Fabricate wood door frames to AWS Section 6, Custom grade in solid pine, as indicated on the drawings.

.2 Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to relative humidity conditions existing during time of fabrication and in installation areas.

.3 Fabricate woodwork to dimensions, profiles, and details indicated. Coordinate with Section 08 14 16 "Flush Wood Doors".

.4 Ease edges to 1.5 mm radius.

.5 Complete fabrication, including assembly and finishing, and hardware application before shipment to Project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

.6 Shop-cut openings, to maximum extent possible, to receive hardware and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts. Coordinate with Section 08 71 10 "Door Hardware".

.7 Prepare for opaque paint finish as specified in Section 09 91 00 "Painting".

2.5 FINISHES

.1 Transparent finish:

.1 Prepare wood surfaces in accordance with AWS Section 5, custom grade workmanship.

.2 Shop-finish wood surfaces in accordance with QSI Section 5, System 3, custom grade, as follows:
  .1 Vinyl washcoat
  .2 Stain (where indicated only), colour to the approval of the Consultant.
  .3 Vinyl sealer
  .4 Sand 220 grit
  .5 First topcoat post-catylized lacquer
  .6 Second topcoat post-catylized lacquer
.3 Finished work shall meet the visual testing criteria of AWS Section 5, Article 7 "General" custom grade.

.2 Opaque paint finish:
  .1 Refer to Section 09 91 00 "Painting".

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 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 INSTALLATION

.1 Install finish carpentry to AWS Custom Grade, except where specified otherwise.

.2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.

.3 Form joints to conceal shrinkage.

3.3 CONSTRUCTION

.1 Fastening:
  .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
  .2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
  .3 Set finishing nails to receive filler. Where screws are used to secure members, countersink

screw in round cleanly cut hole and plug with wood plug to match material being secured.

.4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

.2 Standing and running trim:
- .1 Baseboard: 100 mm x 10 mm x 3657 mm long MDF, shop primed.
- .2 Shoe mould: 19 mm x 19 mm finger-jointed pine.
- .3 Door trim:
  - .1 Within units: 65 mm x 16 mm MDF, shop primed.
  - .2 Suite entrance door:
    - .1 Suite side: 89 mm x 19 mm MDF over steel frame.
    - .2 Common hallway side: "Georgian" style "finger groove" profile MDF trim with decorative corner blocks and matching header trim over steel frame.
    - .3 Threshold: "Breccia Oniciata" marble, 152 mm wide x 19 mm thick, full width of door opening with 51 mm wide bevel to 13 mm edge thickness on common hallway side and 25 mm wide bevel to 16 mm edge thickness on apartment side. Ensure a secure, level installation and proper clearance between door and threshold to accommodate air transfer requirements specified under Division 23 "HVAC".
- .4 Window sills: 19 mm x 89 mm finger-jointed pine, bullnose edge.
- .5 Cut right angle joints of casing and base with mitred joints.
- .6 Fit backs of casing snugly to wall surfaces to eliminate cracks at junction of casing with walls.
- .7 Install door and window trim in single lengths without splicing.

.3 Frames:
- .1 Set frames with plumb sides and level heads and sills and with no distortions. Shim as required with concealed shims. Install to a tolerance of 3 mm in 2400 mm.
- .2 Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
- .3 Anchor frames to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with wood surfaces.

.4 Shelving:
- .1 16 mm thick white melamine shelving complete with matching polyester edge banding.
- .2 Provide continuous edge support and supplemental supports to shelf and rod at maximum 900 mm o.c. Refer to Section 08 71 13 "Cabinet and Miscellaneous Hardware" for rod.
- .3 Provide painted wood ledgers, three edges.
- .4 Provide a bank of five shelves, 300 mm deep x 450 mm deep, at one end of each closet, separated from the remainder of the closet by a gable extending from the floor to a hat shelf and continuous rail in the remainder of the closet.

.5 Other items: Provide other finish carpentry items as indicated and as required for a complete project.

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:
- .1 The work of this Section includes the provision of all labour, materials, equipment and services required to fabricate and install melamine board casework, as indicated on the drawings, as specified herein and as required for a complete project.
- .2 The base bid price shall be based on the specified cabinetwork. Alternative prices will be required for various up-grades.

.2 Related Work:
- .1 Section 06 10 00 - Rough Carpentry.
- .2 Section 06 20 00 - Finish Carpentry.
- .3 Section 07 92 00 - Joint Sealants.
- .4 Section 08 71 13 - Cabinet and Miscellaneous Hardware.
- .5 Division 22 - Plumbing.

1.3 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI):
- .1 ANSI A208.1-2009, Particleboard.
- .2 ANSI A208.2-2009, Medium Density Fiberboard for Interior Applications.

.2 Architectural Woodwork Manufacturers' Association of Canada (AWMAC):
- .1 Architectural Woodwork Standards, 2nd. Edition, 2014 (referred to hereinafter as "AWS").

.3 Canadian Standards Association (CSA):
- .1 CSA-B111-1974(R2003), Wire Nails, Spikes and Staples.
- .2 CAN/CSA-O141-05(R2014), Softwood Lumber.

.4 Canadian General Specification Board (CGSB):
- .1 CAN/CGSB-11.3-M87 Hardboard.

.5 National Electric Manufacturers Association (NEMA):
- .1 ANSI/NEMA LD3-2005, High-Pressure Decorative Laminates (HPDL).

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 Shop Drawings:
- .1 Cabinetwork shop drawings to be to the same units of measure as architectural drawings. Details to be to the same hand.
- .2 Clearly indicate details of construction, profiles, jointing, fastening and other related details.

.3 Samples:
- .1 Submit a full size sample of a typical upper cabinet complete with specified hardware.
- .2 Submit duplicate colour samples of laminated plastic and melamine for colour selection.
- .3 The accepted sample shall be the standard of acceptance for the work of this Section.

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

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Protect materials against dampness during and after delivery.

.2 Store materials in ventilated areas, protected from extreme changes of temperature or humidity.

.3 Cover finished melamine and laminated plastic surfaces heavy kraft paper or put in cartons during shipment. Protect installed laminated surfaces by approved means. Do not remove protection until immediately before final inspection.

.4 Do not store or install materials in areas where relative humidity is less than 25% or greater than 60% at 22ºC.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

1.7 WARRANTY

.1 For cabinetwork materials, finishes, fabrication and installation, the 12-months warranty period prescribed in the General Conditions of the Contract is extended to five years.

Part 2 Products

2.1 LUMBER MATERIALS

.1 Softwood lumber: Pine species: 6 to 12% moisture content, grades in accordance with AWS Section 3, as follows:
- .1 Exposed Work: Premium Grade
- .2 Semi exposed work: Custom Grade or better.
- .3 Concealed work: Economy Grade or better.
- .4 Finger-jointed lumber is not acceptable.

2.2 PANEL MATERIALS

.1 Douglas fir plywood: to CSA O121, sanded grades selected to produce the following visible faces:
- .1 Exposed work: "Good" sides (G1S or G2S as appropriate).
- .2 Semi-exposed work: "Solid" sides (Back side of G1S or S1S or S2S as appropriate)
- .3 Concealed work: Any sanded grade.

.2 Mat-formed wood particleboard: To ANSI A208.1, Grade R, containing no added ureaformaldehyde, density 449 k/m^3.

.3 Melamine panels: Melamine resin impregnated decorative sheet thermal-fused to rigid particleboard substrate to the following standards:
- .1 Core: Mat-formed wood particleboard as specified above.
- .2 Melamine finish: Minimum 120 gram weight, thermally fired to both sides of particleboard. Colours to be selected by the Consultant from the melamine manufacturer's complete colour range.
- .3 Prepainted UV board or vinyl-faced board is not acceptable as a substitute for melamine panels specified herein.

.4 Hardboard: to CAN/CGSB-11.3, Type 2 (tempered), containing no added ureaformaldehyde, density 496 kg/m^3, thickness 5 mm unless otherwise indicated, prefinished one side, colour white.

.5 Edge banding for melamine panels: "Polyband" polyester edge banding, 60 gram print paper, fully impregnated with polyester resin, hot meltcoated. Colour to match melamine. Apply to all exposed edges.

.6 Medium Density Fibreboard (MDF): to ANSI 208.2., density 769 kg/m^3.

.7 Laminated plastic: in accordance with AWS Section 4, based on grades established by NEMA LD3, as follows:
- .1 Postforming Grade (HGP):
  - .1 1 mm thick, satin textured finish colours to be selected by the Consultant from the manufacturer's complete colour range.
  - .2 Core: Particleboard as specified herein.
- .2 Flatwork: Horizontal General Purpose Grade (HGS), 1.2 mm thick, satin textured finish, colours to be selected by the Consultant from the manufacturer's complete colour range.

.8 Adhesives: As recommended by the casework fabricator for each specific application.

.9 Sealants: in accordance with Section 07 92 00 "Joint Sealants".

.10 Nails and staples: to CSA B111, galvanized.

2.3 CABINETS

.1 General description:
- .1 Cabinets to be fabricated from melamine panels, 16 mm thick.
- .2 AWMAC Quality Grade: Custom.

.3 Casework Type: Flush overlay.
.4 Edge banding: Polyester, hot-melt bonded to panel edges. Colour to match melamine.
.5 Sections of cabinet/vanity containing sinks shall be fabricated with appropriate frame construction.

.2 Gables: 16 mm melamine panels, edge banded, drilled for adjustable shelves.

.3 Tops of upper cabinets and cabinet bottoms: 16 mm melamine panels, edge banded.

.4 Doors and drawer fronts: 16 mm melamine panels, edge banded.

.5 Shelves: 16 mm melamine panels, edge banded, adjustable, supported on plastic clips into predrilled holes in gables.

.6 Backs:
.1 Upper cabinets: 5 mm tempered hardboard, prefinished white, recessed 10 mm and backed up top and bottom by 19 mm x 64 mm melamine panel rails.
.2 Lower cabinets: Rails top and bottom, no hardboard.

.7 Drawer construction: 16 mm melamine sub-front, sides and back. 3 mm prefinished hardboard bottom.

.8 Assembly and Finishing:
.1 Sand polyester edge banding to provide smooth edges.
.2 There shall be no exposed fasteners.

.9 Countertops: post formed plastic laminate with 100 mm backsplash on 16 mm particle board, rolled front on kitchens, Corian edgebanding in bathrooms.

.10 Kickboards: 100 mm high x 13 mm thick, prefinished black melamine.

2.4 FABRICATION

.1 Cabinets to be fabricated using melamine panels throughout. Paint-finish or vinyl faced materials are unacceptable.

.2 Fabricate cabinetwork to applicable AWMAC custom quality standard except where otherwise specified or otherwise indicated on the drawings.

.3 Fabricate and assemble cabinetwork items in fabricator's shop.

.4 Verify dimensions on site before commencing fabrication.

.5 Fabricate units to manufacturer's standard lengths as follows:
.1 250 mm to 550 mm in 50 mm increments.
.2 600 mm to 1200 mm in 100 mm
.3 Maximum length of upper cabinet: 900 mm
.4 Maximum length of lower corner cabinet: 1200 mm.

.6 Provide matching filler pieces at ends of runs adjacent to return walls to make up dimension for exact fit. Maximum width of filler pieces to be 50 mm.

.7 Join units on site with screws. Knock-down joint locations to be indicated on shop drawings, for review by the Consultant.

.8 Shop joints to be pressure glued and hardwood dowelled, tight and flush, without nailing.

.9 Fabricate fixed shelves and web frames with dado joints stopping back of exposed junctions.

.10 Provide for built-in mechanical and electrical services and other equipment. Verify locations before cutting or drilling and allow suitable tolerances where required. Check shop drawings for such items. Where design requires services built-in during fabrication, employ a qualified technician and provide appropriate materials. Comply with governing codes.

.11 Shop install cabinet hardware for doors, shelves and drawers. Use countersunk screws.

.12 Shelving to upper cabinets to be adjustable unless otherwise noted.

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 Do not install base cabinets until gypsum board behind cabinets has been painted.

.2 Set and secure all materials and components in place, rigid plumb and square. Caulk counter tops to walls, scribe cabinets to walls and floors, install filler mouldings where required. Secure all cabinets to walls and floors, through back rails, top and bottom.

.3 Scribe "toe kick" to floor. Hardboard "toe kick" unacceptable.

.4 Provide heavy duty fixture attachments for wall mounted cabinets. Coordinate with Section 06 10 00 to ensure the provision of adequate wood blocking for fastening to stud walls.

.5 Use draw bolts in counter top joints. Make flush hairline joints.

.6 At junction of counter back splash and adjacent wall finish, apply a small continuous bead of white silicone caulking. Refer to Section 07 92 00 "Joint Sealants".

.7 After installation, fit and adjust operating hardware for cabinet doors, drawers and shelves. Adjust so that doors and drawer fronts are perpendicular and square.

.8 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures. Ensure that cutouts are accurate, square and perpendicular where applicable, in required locations and at required heights.

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 apply rubberized-asphalt sheet waterproofing to below-grade exterior concrete walls, 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 27 10 - Membrane Air/Moisture Barrier.
- .3 Section 31 23 10 - Excavating, Trenching and Backfilling.
- .4 Section 33 46 20 - Foundation Drainage.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM C836/C836M-12, Standard Specification for High Solids Content, Cold Liquid-Applied ElastomericWaterproofing Membrane for Use with Separate Wearing Course.
- .2 ASTM D412-06a(2013) plus Adjunct, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers.
- .3 ASTM D570-98(2010)e1, Standard Tect Method for Water Absorption of Plastics.
- .4 ASTM D1621-10, Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- .5 ASTM D1970/D1970M-14, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice and Dam Protection.
- .6 ASTM D4258-05(2012), Standard Practice for Surface Cleaning Concrete for Coating.
- .7 ASTM D4263-83(2012), Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
- .8 ASTM D4716/D4716M-14, Standard Test Method for Determining the (In-Plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
- .9 ASTM D5385/D5385M-93(2014)e1, Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.
- .10 ASTM D6135-97, Standard Practice for Applicatin of Self-Adhering Modified Bituminous Waterproofing.
- .11 ASTM E96/E96M-13, Standard Test Methods for Water Vapor Transmission of Materials.
- .12 ASTM E154/E154M-08a(2013)e1, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

1.4 PERFORMANCE REQUIREMENTS

.1 Provide waterproofing that prevents the passage of water.

.2 The waterproofing membrane and all auxiliary components shall be fully compatible with the ICF substrate.

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: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

.3 Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

.4 Sample Warranty: Copy of special waterproofing manufacturer's warranty stating obligations, remedies, limitations, and exclusions before starting waterproofing.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver liquid materials to project site in original packages with seals unbroken, labelled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

.2 Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.

.3 Remove and replace liquid materials that cannot be applied within their stated shelf life.

.4 Store rolls according to manufacturer's written instructions.

.5 Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

.1 Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer.

.2 Do not apply waterproofing to a damp or wet substrate.

.3 Do not apply waterproofing in snow, rain, fog, or mist.

.4 Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8 WARRANTY

.1 For the work of this Section, the 12-months warranty prescribed in the General Conditions of the Contract is extended to 3 years.

.2 Provide written warranty, signed by waterproofing manufacturer agreeing to replace waterproofing material that does not comply with requirements or that does not remain watertight during specified warranty period.

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, including packaging materials, generated by the work of this Section in accordance with the Waste Management Plan.

Part 2 Products

2.1 MANUFACTURERS

.1 The following rubberized asphalt sheet waterproofing products are acceptable:
- .1 CCW 701 by Carlisle Corporation
- .2 Bituthene by W. R. Grace & Co.
- .3 Elasto-Seal 2000 by Bakor Inc.

.2 The following moulded sheet drainage panel products are acceptable:
- .1 Q-Drain Type V by Carlisle Corporation.
- .2 Miradrain 6200 by Mirafi Inc.
- .3 Hydroproduct 2 Drainage Composite by W. R. Grace.

.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 RUBBERIZED ASPHALT SHEET WATERPROOFING

.1 Rubberized Asphalt Sheet: 1.52 mm thick, self-adhering sheet consisting of 1.42 mm of rubberized asphalt laminated to a 0.10 mm thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction. Physical Properties as follows, measured in accordance with standard test methods referenced:
- .1 Tensile Strength (ASTM D412, Die C, modified): 1723 kPa minimum.
- .2 Ultimate Elongation (ASTM D412, Die C, modified): 300% minimum.
- .3 Low-Temperature Flexibility (ASTM D1970): Pass at minus 28.8°C.
- .4 Crack Cycling (ASTM C836): Unaffected after 100 cycles of 3.2 mm movement.
- .5 Puncture Resistance (ASTM E154): 178 N minimum.
- .6 Hydrostatic-Head Resistance (ASTM D5385): 45 m minimum.

.7 Water Absorption (ASTM D570): 0.15% weight-gain maximum after 48-hour immersion at 21°C.
.8 Vapour Permeance (ASTM E96, Water Method): 0.05 perms.

2.3 AUXILIARY MATERIALS

.1 General: Provide auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
.1 Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdiction.

.2 Primer: Liquid waterborne primer recommended for substrate by sheet waterproofing manufacturer.

.3 Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.

.4 Sheet Strips: Self-adhering, rubberized-asphalt composite sheet strips of same material and thickness as sheet waterproofing.

.5 Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.

.6 Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.

.7 Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

.8 Metal Termination Bars: Aluminum bars, approximately 25 mm x 3 mm thick, predrilled at 230 mm o.c.

2.4 COMPOSITE DRAINAGE PANELS

.1 Refer to Section 33 46 20 "Foundation Drainage".

Part 3 Execution

3.1 EXAMINATION

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

.2 Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer. Confirm concrete curing and form-release materials are compatible with waterproofing installation materials.

.3 Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.

.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 SURFACE PREPARATION

.1 Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

.2 Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

.3 Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

.4 Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

.5 Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D4258.

.6 Install sheet strips and centre over treated construction and contraction joints and cracks exceeding a width of 1.5 mm.

.7 Bridge and cover isolation joints and discontinuous wall-to-wall joints with overlapping sheet strips. Invert and loosely lay first sheet strip over centre of joint. Firmly adhere second sheet strip to first and overlap to substrate.

.8 Corners: Prepare, prime, and treat inside and outside corners according to ASTM D6135. Install membrane strips centred over vertical inside corners.
- .1 Install 20 mm fillets of liquid membrane on horizontal inside corners and as follows:
- .2 At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centred over corner.

.9 Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D6135.

3.3 RUBBERIZED ASPHALT SHEET APPLICATION

.1 Install self-adhering sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D6135.

.2 Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

.3 Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 65 mm minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

.4 When ambient and substrate temperatures range between -4°C and 5°C, install self-adhering, rubberized-asphalt sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 15°C.

.5 Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.

.6 Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic or sealant.

.7 Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheets extending 150 mm beyond repaired areas in all directions.

.8 Correct deficiencies in or remove sheet waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

3.4 SEQUENCING FOR PIT WATERPROOFING

.1 Apply waterproofing membrane in two stages, as follows:
- .1 After mud-slab at bottom of pit is sufficiently cured, apply primer and waterproofing membrane to the mud-slab surface to extend mininum 200 mm beyond the exterior perimeter of the pit walls.
- .2 After the pit walls and floor have been constructed and are sufficiently cured, clean the exposed portion of the horizontal waterproofing membrane and prepare the membrane surface so that a proper bond with the vertical waterproof membrane can be achieved.
- .3 Apply primer and waterproofing membrane to the exterior surfaces of the pit walls, extending down to the bottom of the walls and out over the exposed portion of the horizontal waterproofing membrane. Lap over the horizontal membrane minimum 150 mm and apply pressure to ensure a complete watertight connection between the two membranes.

3.5 DRAINAGE PANEL INSTALLATION

.1 Refer to Section 33 46 20 "Foundation Drainage".

3.6 PROTECTION AND CLEANING

.1 Protect waterproofing from damage and wear during remainder of construction period.

.2 Protect installed insulation drainage panels from damage due to ultraviolet light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where drainage panels will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

.3 Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

.4 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 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 supply and install building insulation, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Work:
- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 04 20 00 - Unit Masonry.
- .3 Section 06 10 00 - Rough Carpentry.
- .4 Section 07 13 26 - Self-Adhering Sheet Waterproofing.
- .5 Section 07 21 19 - Urethane Foam Insulating Sealant.
- .6 Section 07 26 00 - Membrane Vapour Retarders.
- .7 Section 07 27 10 - Membrane Air/Moisture Barrier.
- .8 Section 07 52 16 - SBS Modified Bituminous Roofing.
- .9 Section 09 21 16 - Gypsum Board Assemblies.
- .10 Section 09 22 16 - Non-Structural Steel Stud Systems.
- .11 Section 31 23 10 - Excavating, Trenching and Backfilling.

1.3 REFERENCE STANDARDS

.1 Underwriters' Laboratories of Canada (ULC):
- .1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene Boards and Pipe Covering.
- .2 CAN/ULC-S702-14, Thermal Insulation, Mineral Fibre, for Buildings.

1.4 DELIVERY, STORAGE & HANDLING

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

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

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on the specified products.

.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 BOARD INSULATION

.1 Polystyrene board insulation: Wall insulation, below grade insulation and where not otherwise indicated: Type IV, square ends, shiplap edges except where otherwise indicated, thickness as indicated. Minimum RSI 0.87 $m^{2.o}C/W$ per 25 mm thickness, compressive strength 207 kPa. Standard of Acceptance: Styrofoam SM.

.2 Roof insultaion: Refer to Section 07 52 16 "SBS Modified Bituminous Roofing".

2.3 BATT INSULATION

.1 Thermal insulation batts: Mineral wool fibre batt insulation for wood frame application made from basalt rock and steel slag, conforming to CAN/ULC-S702, Type 1, minimum 40% recycled content. Standard of acceptance: Roxul Flexibatt insulation.

.2 Acoustical fire batts for interior partitions where acoustical insulation is called for and where the batt insulation consitutes part of a fire resistant assembly: AFB mineral wool fibre batt insulation made from basalt rock and steel slag, conforming to CAN\ULC-S702, Type 1, minimum 40% recycled content. Standard of acceptance: Roxul AFB acoustical fire batt.

2.4 ACCESSORIES

.1 Provide mechanical fasteners, insulation clips, and other accessories as recommended by the insulation manufacturer to retain the insulation in position, for each specific application.

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 Where applicable, verify that the air vapour barrier is in place and undamaged and has been reviewed and accepted by the Consultant.

.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 WORKMANSHIP

.1 Do not install insulation until the work behind it has been reviewed and accepted by the Consultant.

.2 Install 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.

.3 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.

.4 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.

.5 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.

.6 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation in accordance with the manufacturer's instructions.

.7 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of chimneys and vents.

.8 Where necessary, retain insulation in position with mechanical fasteners recommended by the insulation manufacturer for the specific application.

.9 Do not enclose insulation until it has been reviewed and accepted by the Consultant.

3.3 BELOW-GRADE INSULATION

.1 Where indicated, install below grade insulation.

.2 Install in strict accordance with the manufacturers printed instructions, after the concrete is fully cured.

.3 Install with tight shiplap joints.

.4 Where necessary to hold insulation boards in place, apply adhesive (compatible with polystyrene) to the boards. Press insulation boards into position prior to skinning of adhesive.

.5 Coordinate with the excavating, trenching and backfilling contractor to ensure suitable preparation of the subgrade to receive below-grade horizontal insulation.

.6 Butt adjacent insulation boards up tightly and ensure that corners are fully lapped.

.7 Trim insulation boards as needed to fit around openings and projections.

3.4 ABOVE-GRADE WALL INSTALLATION

.1 Install insulation, in the thickness indicated, to maintain continuity of thermal protection to building elements and spaces.
- .1 Coordinate joint locations with masonry connector locations to minimize cutting of insulation.
- .2 Cut and trim insulation neatly to fit spaces. Butt joints tightly. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .3 Cut and fit tightly around obstructions such as exterior doors and windows and other penetrations and protrusions.
- .4 Fill voids with insulation.
- .5 Remove projections that interfere with placement.

.2 Attachment:
- .1 Retain insulation firmly against the surface of the interior wythe of the wall with cavity wall insulation retaining devices, purpose-made to fit masonry tab ties
- .2 Where the use of the insulation retaining devices is not feasible, retain insulation with specified spindle anchors and washers.
- .3 Locate retaining devices on a grid not to exceed 408 mm x 610 mm.

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 polyurethane foam insulating sealant, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Work:
- .1 Section 07 21 00 - Building Insulation
- .2 Section 07 92 00 - Joint Sealants.
- .3 Section 08 17 26 - Aluminum Clad Wood Door/Frame Assemblies.
- .4 Section 08 52 13 - Aluminum Clad Wood Windows.

1.3 REFERENCES

.1 Underwriters' Laboratories of Canada (ULC):
- .1 CAN/ULC-S102-10, Method of Test for Surface Burning Characteristics of Building Materials and 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.

1.5 ENVIRONMENTAL REQUIREMENTS

.1 Apply insulation only when surfaces and ambient temperatures are within the manufacturer's prescribed limits.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

1.7 COMPATIBILITY

.1 Provide written certification, signed by the insulating sealant manufacturer, that sealant is fully compatible with the building air/vapour barrier membrane. Confirm that the membrane will not shrink and pull the membrane away from its substrate.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MATERIAL

.1 Foam insulating sealant: Two-component polyurethane foam insulating sealant, ULC Class I (flame spread of 25 or less) to CAN\ULC-S102.

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 Ensure that surfaces are free of dust, oil, grease and other loose debris which may impair bond.

.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 PROTECTION

.1 Provide suitable protective masking to adjacent exposed surfaces.

3.3 FOAM INSULATING SEALANT APPLICATION

.1 Apply foam insulating sealant in strict accordance with the manufacturer's printed directions, using dispensing gun from material manufacturer. Fill all voids in the exterior wall insulation with sealant.

.2 Apply in all locations where required to maintain the continuity of the insulation and/or the vapour barrier, including, but not necessarily limited to the following:
- .1 Sealing voids in the exterior envelope of the building and at all locations where the continuity of the insulation is interrupted.
- .2 Sealing at junctions between materials and components which comprise the air barrier as required to maintain continuity of the air barrier.
- .3 All locations indicated on the drawings.

.3 Note that this material expands 2.5 times its original volume when applied. Do not overfill voids.

.4 If necessary, apply in several layers, each successive layer being allowed to cure before next layer is applied.

.5 Curing may be accelerated in deep cavities by slight moistening of surrounding surfaces prior to application.

.6 While curing, foam to be tooled, if required.

.7 If leakage occurs after curing, cut back flush with surrounding surfaces or recess to sufficient depth to provide for finishing caulking.

3.4 CLEANING

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

.2 Remove masking and temporary protection from adjacent surfaces.

.3 Clean and make good any damage to adjacent surfaces 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 install an exterior insulation and finish system, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 06 10 00 - Rough Carpentry.
- .2 Section 07 27 10 - Membrane Air Barrier.
- .3 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .4 Section 07 92 00 - Joint Sealants

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM B117-11, Standard Practice for Operating Salt Spray (Fog) Apparatus.
- .2 ASTM C67-13a, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
- .3 ASTM C150/C150M-12, Standard Specification for Portland Cement.
- .4 ASTM C177-13, Standard Test method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guard-Hot-Plate Apparatus.
- .5 ASTM C203-05a(2012), Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
- .6 ASTM C272/C272M-12, Standard Test Method for Water Absorption of core materials for Structural Sandwich Constructions.
- .7 ASTM C297/C297M-04(2010), Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions.
- .8 ASTM C303-10, Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
- .9 ASTM C518-10, Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- .10 ASTM C847-12, Standard Specification for Metal Lath.
- .11 ASTM C1177/C1177M-13, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .12 ASTM C1325-08b, Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement Substrate Sheets.
- .13 ASTM C1396/C1396M-13, Standard Specification for Gypsum Board.
- .14 ASTM D968-05(2010), Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
- .15 ASTM D1621-10, Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- .16 ASTM D1622-08, Standard Test Method for Apparent Density of Rigid Cellular Plastics.

.17 ASTM D2247-11, Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
.18 ASTM D2863-13, Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index).
.19 ASTM D3273-12, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
.20 ASTM D4060-10, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
.21 ASTM E72-13a, Standard Test Method for Conducting Strength Tests of Panels for Building Construction.
.22 ASTM E84-13a, Standard Test Method for Surface Burning Characteristics of Building Materials.
.23 ASTM E96/E96M-13, Standard Test Methods for Water Vapor Transmission of Materials.
.24 ASTM E119-12, Standard Test Methods for Fire tests of Building Construction and Materials.
.25 ASTM E283-04(2012), Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
.26 ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
.27 ASTM E331-00(2009), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference.
.28 ASTM E2098/E2098M-13, Standard Test method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish Systems (EIFS), after Exposure to a Sodium Hydroxide Solution.
.29 ASTM E2134-01(2006), Standard Test Method for Evaluating the Tensile-Adhesion Performance of an Exterior Insulation and Finish System (EIFS).
.30 ASTM E2273-03(2011), Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies.
.31 ASTM E2485/E2485M-13, Standard Test Method for Freeze/Thaw Resistance for Exterior Insulation and Finish Systems (EIFS) and Water Resistive Barrier Coatings.
.32 ASTM E2486/E2486M-13, Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS).
.33 ASTM G154-12a, Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.
.34 ASTM G155-13, Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.

.2 Canadian Construction Materials Centre (CCMC):
.1 Technical Guide for EIFS Evaluation

.3 Dryvit Systems Canada:
.1 DSC131, Dryvit Expanded Polystyrene Insulation Board Specification
.2 DSC151, Custom Brick™ Polymer System Specifications for Use On Vertical Walls
.3 DSC152, Dryvit Cleaning and Recoating
.4 DSC153, Dryvit Expansion Joints and Sealants
.5 DSC159, Dryvit Water Vapor Transmission
.6 DSC456, Rapidry DM™ 35-50 or DS457, Rapidry DM™ 50-75 Data Sheets
.7 DSC494, Dryvit AquaFlash® System

.8 DSC603 Dryvit Outsulation PD System Installation Details

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

.5 International Standards Organization (ISO):
.1 CAN/CSA-ISO 9000-05(R2005), Quality Management Systems - Fundamentals and Vocabulary.

.6 National Fire Protection Association (NFPA):
.1 NFPA 268-12, Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source.
.2 NFPA 285-12, Standard Test Method for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus.

.7 Underwriters' Laboratories of Canada (ULC):
.1 CAN/ULC-S101-07, Standard Methods of Fire Endurance Tests of Building Construction and Materials.
.2 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.3 CAN/ULC-S114-05, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
.4 CAN/ULC-S134-13, Standard Method of Fire Tests of Exterior Wall Assemblies.
.5 CAN/ULC-S716.1-12. Standard for Exterior Insulation and Finish Systems (EIFS) - Materials and Systems.

1.4 DEFINITIONS

.1 *Base Coat:* Material used to encapsulate one or more layers of reinforcing mesh fully embedded that is applied to the outside surface of the EPS.

.2 *Building Expansion Joint:* A joint through the entire building structure designed to accommodate structural movement.

.3 *Contractor:* The contractor that installs the EIFS.

.4 *Expansion Joint:* A structural discontinuity in the EIFS designed to accommodate structural movement.

.5 *Finish:* An acrylic-based coating, available in a variety of textures and colours that is applied over the base coat.

.6 *Insulation Board:* Expanded polystyrene (EPS) insulation board, which is affixed to the substrate.

.7 *Manufacturer:* The manufacturer of the exterior insulation and finish system materials and components.

.8 *Panel Erector:* The contractor who installs the panellized system(s).

.9 *Panel Fabricator:* The contractor who fabricates the panellized system(s).

.10 *Reinforcing Mesh:* Glass fibre meshes used to reinforce the base coat and to provide impact resistance.

.11 *Sheathing:* A substrate in sheet form.

.12 *Substrate:* The material to which the EIFS are affixed.

.13 *Substrate System:* The total wall assembly including the attached substrate to which the EIFS is affixed.

1.5 SYSTEM DESCRIPTION

.1 Exterior Insulation and Finish System (EIFS), Class PB, utilizing a cavity wall concept with capability for moisture drainage. The system to consist of a water-resistive barrier coating (air/water-resistive barrier), an adhesive, grooved expanded polystyrene insulation board, starter strip incorporating drainage and ventilation, base coat, reinforcing meshes and finish.

.2 Where a 1-hour fire resistance is required as per the provisions of Article 3.2.3.7 of the NBC - Exposing Building Faces, the EIFS shall include a noncombustible protective base coat material and the assembly shall satisfy the requirements of Sentence 3.2.3.7.(7).

.3 Methods of Installation
- .1 Field Applied: The EIFS is applied to the substrate system in place.
- .2 Panellized: The EIFS is shop-applied to prefabricated wall panels.

1.6 DESIGN REQUIREMENTS:

.1 Substrates:
- .1 Acceptable substrates for the EIFS shall be one of the following:
  - .1 Glass-mat, water-resistant gypsum core, exterior sheathing board with fibreglass mat facers to ASTM C1177.
  - .2 Exterior fibre-reinforced cement board sheathing to ASTM C1325.
  - .3 Unglazed brick, cement plaster, concrete or masonry.
  - .4 Galvanized expanded metal lath to ASTM C847, 1.4 or 1.8 kg/m^2 to installed over a solid substrate.
- .2 Paper-faced gypsum sheathing is not acceptable.
- .3 Deflection of the substrate systems shall not exceed 1/240 times the span.
- .4 The substrate shall be flat within 6.4 mm in a 1.2 m radius.
- .5 The slope of inclined surfaces shall not be less than 6:12, and the length shall not exceed 305 mm.

.6 All areas requiring an impact resistance classification higher than "standard", as defined by ASTM E2486, shall be as detailed in the drawings and as specified herein. Refer to impact resistance data included herein.

.2 Expansion Joints: Design and location of expansion joints in the EIFS shall be as indicated. Where not indicated, obtain the Consultant's approval of the expansion joint locations before starting work. As a minimum, expansion joints shall be placed at the following locations:
- .1 Where expansion joints occur in the substrate system.
- .2 Where building expansion joints occur.
- .3 At floor lines in wood frame construction.
- .4 At floor lines of non-wood framed buildings where significant movement is expected.
- .5 Where the EIFS abuts dissimilar materials.
- .6 Where the substrate type changes.
- .7 Where prefabricated panels abut one another.
- .8 In continuous elevations at intervals not exceeding 23 m.
- .9 Where significant structural movement occurs, such as changes in roofline, building shape or structural system.

.3 Secondary Barriers:
- .1 Include secondary barriers as required for conformance to CCMC evaluation and the provisions of CAN/ULC-S716.1.
- .2 The secondary barrier shall provide meet the requirements for air barrier classification have an air leakage rate of <0.05L/s.m^2 @ 75Pa.
- .3 The location and performance characteristics of the air barrier system shall meet the requirements of Part 5 of the governing building code for the project.

.4 Terminations:
- .1 Prior to applying the EIFS treat wall openings with the manufacturer's standard starter strip / flashing system. Comply with the manufacturer's installation instructions and details. details.
- .2 Hold back the EIFS from adjoining materials around openings and penetrations such as windows, doors, and mechanical equipment a minimum of 19 mm for sealant application. Comply with the manufacturer's installation instructions and details.
- .3 Terminate the system a minimum of 203 mm above finished grade.
- .4 Sealants: Refer to Section 07 92 00 "Joint Sealants".
  - .1 Sealants shall be compatible with the EIFS materials. Comply with the manufacturer's current listing of sealants tested by the sealant manufacturer for compatibility.
  - .2 The sealant backer rod shall be closed cell.
  - .3 Apply sealant to primed base coat and not directly to acrylic finish.

.5 Vapour Barrier: Locate vapour retarder within the wall assembly in compliance with the requirements of Part 5 of the applicable building code, as specified and as indicated on the drawings.

.6 Flashing: Provide flashing at all roof-wall intersections, windows, doors, chimneys, decks, balconies and other areas as necessary to prevent water from entering behind the EIFS.

1.7 PERFORMANCE REQUIREMENTS

.1 The EIFS shall have been tested as follows.

.2 Air/Water-Resistive Barrier Coating

TEST	TEST METHOD	CRITERIA	RESULTS
Tensile Bond	ASTM C297 / E2134 ICC ES (AC 212)*	Minimum 104 kPa	Substrate: Min.131 kPa Flashing: Min. 2970 kPa
Freeze-thaw	ASTM E2485 / ICC ES Proc. ICC ES (AC 212)*	No deleterious effects after 10 cycles	Passed - No deleterious effects after 10 cycles
Water Resistance	ASTM D2247 ICC ES (AC 212)*	No deleterious effects after 14 days exposure	No deleterious effects after 14 days exposure
Water Vapour Transmission	ASTM E96 Proc.B ICC ES (AC 212)*	Vapour Permeable	7 perms
Air Leakage	ASTM E283	No Criteria	0.6 L/min/m^2
Structural Performance	ASTM E1233 Proc.A ICC ES (AC 212)*	Minimum 10 positive cycles at 1/240 deflection; no cracking in field, at joints or interface with flashing	Passed
Racking	ASTM E72 ICC ES (AC 212)*	No cracking in field at joints or interface with flashing at net deflection of 3.2 mm	Passed
Restrained Environmental	ICC ES Procedure ICC ES (AC 212)*	No cracking in field, at joints or interface with flashing	
Water Penetration	ASTM E331 ICC ES (AC 212)*	No water penetration beyond the innermost plane of the wall after 15 minutes at 137Pa	Passed
Weathering UV Exposure	ICC ES Procedure ICC ES (AC 212)*	210 hours of exposure	Passed
Accelerated Aging	ICC ES Procedure ICC ES (AC 212)*	25 cycles of drying and soaking	Passed
Hydrostatic Pressure Test	AATCC 127 ICC ES (AC 212)*	54.86 cm water column for 5 hours	Passed
Surface Burning Characteristics	ASTM E84	Flame Spread <25 Smoke Developed <450	Passed

** AC 212 - Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers Over Exterior Sheathing*

.3 Durability:

TEST	TEST METHOD	CRITERIA	RESULTS
CCMC Durability under Environmental Cyclic Conditions	CCMC EIFS Technical Guide Section 5.6.1 as per Appendix A2	No water penetration. No cracking, crazing, blistering or sagging of finish or base coat. Etc. Min 60 cycles	Passed (Primus^{R})
Abrasion Resistance	ASTM D968	No deleterious effects after 500 litres	No deleterious effects after 1000 litres
Accelerated Weathering Air Leakage	ASTM G155 Cycle 1	No deleterious effects after 2000 hours	No deleterious effects after 5000 hours
	ASTM G154 Cycle 1 (QUV)		No deleterious effects after 5000 hours
Freeze-Thaw	ASTM E2485 (formerly EIMA 101.01)	No deleterious effects after 60 cycles	Passed - No deleterious effects after 90 cycles
	ASTM C67 modified	No deleterious effects after 60 cycles	Passed - No deleterious effects after 60 cycles
	ASTM E2485/ICC-ES Proc. ICC ES (AC 235)***	No deleterious effects after 10 cycles	Passed - No deleterious effects after 10 cycles
Mildew Resistance	ASTM D3273	No growth during 28 day exposure period	No growth during 60 day exposure period
Water Resistance	ASTM D2247	No deleterious effects after 14 days exposure	No deleterious effects after 42 days exposure
Taber Abrasion	ASTM D4060	N/A	Passed 1000 cycles
Salt Spray Resistance	ASTM B117	No deleterious effects after 300 hours exposure	No deleterious effects after 1000 hours exposure
Water Penetration	ASTM D2247	No water penetration beyond the innermost plane of the wall after 15 minutes at 137 Pa	Passed 15 minutes at 137 Pa
Water Vapour Transmission	ASTM E96 Procedure B	Vapour Permeable	EPS 5 perm-inch Base coat* 40 perms Finish** 40 perms
Drainage Efficiency	ASTM E2273 ICC ES (AC 235)***	Minimum Drainage Efficiency of 90%	Passed

** Base Coat perm value based on Dryvit Genesis™*
*** Finish perm value based on Dryvit Quartzputz®*
**** AC 235 - Acceptance Criteria for EIFS Clad Drainage Wall Assemblies*

.4 Structural

TEST	TEST METHOD	CRITERIA	RESULTS
Tensile Bond	ASTM C297 / E2134	Minimum 104 kPa - substrate or insulation failure	Minimum 213.6 kPa
Transverse Wind Load	ASTM E330	Withstand positive and negative wind loads specified by the applicable building code	Minimum 4.3 kPa* 406 mm o.c. framing, 13 mm sheathing, screw-attached at 203 mm o.c.
** All EIFS components remain intact. For higher windloads, contact EIFS manufacturer*			

.5 Impact Resistance: In accordance with ASTM E2486 (formerly EIMA Standard 101.86):

Reinforcing Mesh/Weight g/m²	Minimum Tensile Strengths	EIMA Impact Classification	EIMA Impact Range (Joules)	Impact Test Results (Joules)
Standard - 146	27 g/cm	Standard	3 - 6	4
Standard Plus - 203	36 g/cm	Medium	6 - 10	6
Intermediate - 407	54 g/cm	High	10 - 17	12
Heavy Duty - 509	71 g/cm	Ultra High	>17	18
Heavy Duty Plus - 695	98 g/cm	Ultra High	>17	40
Detail Short Rolls - 146	27 g/cm	n/a	n/a	n/a
Corner Mesh - 244	49 g/cm	n/a	n/a	n/a
** Shall be used in conjunction with Standard Mesh (recommended for areas exposed to high traffic.*				

.6 Fire performance

(SEE NEXT PAGE)

TEST	TEST METHOD	CRITERIA	RESULTS
Fire Resistance	ASTM E119 CAN/ULC-S101	No effect on the fire resistance of a rated wall assembly Stay in place 15 minutes with no through-cracks	Passed 1 hour Passed 2 hours Passed
Ignitability Noncombustibility*	NFPA 268 CAN/ULC-S114	No ignition at 12.5 kw/m^2 at 20 minutes No flaming and retain 80% original test specimen weight	Passed Passed
Full Scale Multi-Storey Fire Test	UBC Std. 26-4 (formerly 17-6) CAN/ULC-S134[1]	1. Resist vertical spread of flame within the core of the panel from one storey to the next. 2. Resist flame propagation over the exterior surface. 3. Resist vertical spread of flame over the interior surface from one storey to the next. 4. Resist significant lateral spread of flame from the compartment of fire origin to adjacent spaces. [1] *As per NBCC Article 3.1.5.5.*	Passed All
Intermediate Multi-Storey Fire Test	NFPA 285 (UBC 26-9) ICC ES (AC 212)*	1. Resist flame propagation over the exterior surface. 2. Resist vertical spread of flame within combustible core/component of panel from one storey to the next. 3. Resist vertical spread of flame over the interior surface from one storey to the next. 4. Resist lateral spread of flame from the compartment of fire origin to adjacent spaces.	Passed
** Base coat formulated for noncombustibility*.			

.7 The EIFS components shall be tested for:

.1 Fire

TEST	TEST METHOD	CRITERIA	RESULTS
Surface Burning Characteristics	ASTM E84 CAN/ULC-S102	All components shall have a: Flame Spread < 25 Smoke Developed < 450	Passed

.2 Durability

TEST	TEST METHOD	CRITERIA	RESULTS
Reinforcing Mesh Alkali resistance of reinforcing mesh	ASTM E2098 (formerly EIMA 105.01)	> 21dN/cm retained tensile strength after exposure	Passed
EPS (Physical Properties): Density Thermal Resistance Water Absorption Oxygen Index Compressive Strength Flexural Strength Surface Burning Flame Spread Smoke Developed	 ASTM C303, D1622 ASTM C177, C518 ASTM C272 ASTM D2863 ASTM D1621 Proc. A ASTM C203 ASTM E84	 15.2 - 20.0 kg/m^3 4.0 @ 4.4°C 3.6 @ 23.9°C 2.5% max. by volume 24% min. by volume 69 kPa 172 kPa 25 max 450 max	 Pass Pass Pass Pass Pass Pass Pass Pass

1.8 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 manufacturer's product data sheets describing all products which will be used on this project.
- .2 Include mixing and installation instructions for all products.
- .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 Shop Drawings for Panellized Construction: Where panellized construction is used, submit shop drawings showing wall layout, connections, details, expansion joints, and installation sequence.

.4 Samples:
- .1 Submit duplicate 300 mm x 300 mm samples of the EIFS for each finish, texture and colour to be used on the project.
- .2 Fabricate samples using the same tools and techniques as proposed for the actual installation.
- .3 Samples shall accurately represent each colour and texture being utilized on the project.

.5 Test Reports: When requested, Submit copies of selected test reports verifying the performance of the EIFS.

.6 Maintenance Data: Provide System Manufacturer's maintenance and repair recommendations for incorporation into the operation and maintenance manual specified in Section 01 78 23 "Operation and Maintenance Manual".

1.9 QUALITY ASSURANCE

.1 Qualifications:
- .1 System Manufacturer:
  - .1 A company with minimum ten years documented successful experience in the actual production of EIFS products. All materials shall be manufactured or sold by the System Manufacturer and shall be purchased from the System Manufacturer or its authorized distributors.
  - .2 Materials shall be manufactured at a facility covered by a current ISO 9001 certification. Certification of the facility shall be done by a registrar accredited by the American National Standards Institute, Registrar Accreditation Board (ANSI-RAB).
- .2 Installer:
  - .1 The Installer shall be experienced and competent in the installation of exterior insulation and finish systems of the type provided for this project.
  - .2 The Installer shall possess a current System Manufacturer's Trained Contractor Registration Certificate* issued by the System Manufacturer.
  - .3 Employ only skilled tradesmen who are experienced in this work.
  - .4 If requested by the Consultant, provide evidence of previously completed projects of a similar nature.
- .3 Insulation Board Manufacturer: Shall be listed by the System Manufacturer, shall be capable of producing the expanded polystyrene (EPS) in accordance with the System Manufacturer's current specification for insulation board and shall subscribe to the System Manufacturer's Third Party Certification and Quality Assurance Program.
- .4 Panel Fabricator: Where a panellized system is provided, the panel fabricator shall be a contractor experienced and competent in the fabrication of architectural wall panels and shall possess a current System Manufacturer's Trained Contractor Registration Certificate.
- .5 Panel Erector: Shall be experienced and competent in the installation of architectural wall panel systems and shall be:

.1 the panel fabricator, or
.2 an erector approved by the panel fabricator, or
.3 an erector under the direct supervision of the panel fabricator.

.2 Regulatory Requirements:
.1 The EPS shall be separated from the interior of the building as required by code (e.g. sheathing as indicated on the drawings).
.2 The use and maximum thickness of EPS shall be in accordance with the applicable building codes.

.3 Certification:
.1 The EIFS shall be recognized for the intended use by the applicable building codes.

.4 Mock-Up:
.1 Before the commencement of the work of this sections, construct a mock-up of a representative sample of each type of EIFS, for the approval of the Consultant.
.2 The mock-up shall be of suitable size as required to accurately represent the products being installed, as well as each colour and texture to be utilized on the project.

.3 The mock-up shall be prepared with the same products, tools, equipment and techniques required for the actual applications. The finish used shall be from the same batch that is being used on the project.
.4 The reviewed and accepted mock-up shall be available and maintained at the jobsite.
.5 For panellized construction, the mock-up shall be available and maintained at the panel fabrication location.

1.10 DELIVERY, STORAGE AND HANDLING

.1 All EIFS materials shall be delivered to the job site in the original, unopened packages with labels intact.

.2 Upon arrival, inspect materials and check for physical damage, freezing or overheating. Do not use questionable materials.

.3 Store materials at the jobsite in a cool, dry location, out of direct sunlight, protected from inclement weather and other sources of damage.
.1 Maintain the System Manufacturer's minimum recommended storage temperatures for the specific materials. Refer to applicable published product data sheets.
.2 Maximum storage temperature shall not exceed 38°C. NOTE: Minimize exposure of materials to temperatures over 32°C. Finishes exposed to temperatures over 43°C for even short periods may exhibit skinning, increased viscosity and must be inspected prior to use.

1.11 ENVIRONMENTAL CONDITIONS

.1 Comply with the System Manufacturer's published recommendations regarding environmental conditions for application of EIFS materials.

.2 Do not apply wet materials during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are completely dry.

.3 At the time of application, the minimum air and wall surface temperatures shall be no less than 4°C. For some products a higher minimum application temperature is required. For the System Manufacturer's minimum recommended application temperatures for the specific materials, refer to applicable published product data sheets.

.4 Maintain these temperatures with adequate air ventilation and circulation for the minimum of time period after application, as recommended by the System Manufacturer for the specific materials,

or until the products are completely dry. Refer to applicable published product data sheets for more specific information.

1.12 SEQUENCING AND SCHEDULING

.1 Coordinate installation of the EIFS with other construction trades.

.2 Employ sufficient manpower and equipment to ensure a continuous operation, free of cold joints, scaffold lines, texture variations, and other imperfections.

1.13 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

1.14 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.

.2 In addition to the 5-year warranty, provide a written System Manufacturer's moisture drainage and limited materials warranty against defective materials.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on Outsulation PD System by Dryvit^{R} Systems Canada Ltd.

.2 Subject to compliance with the specification requirements, equivalent systems by the following manufacturers are acceptable alternatives:
.1 Durock Alfacing International Ltd.
.2 Sto Corporation.

.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.

.4 All components of the EIFS shall be supplied or obtained from one System Manufacturer or its authorized distributors. Substitutions or additions of materials other than specified will not be accepted without the prior written approval of the System Manufacturer and the Consultant.

2.2 MATERIALS

.1 Portland Cement: To ASTM C150, Type 10, white or grey colour, fresh and free of lumps.

.2 Water: Potable, clean and free of foreign matter.

2.3 COMPONENTS

.1 Air/Water-Resistive Barrier Components: Used as a secondary barrier over sheathing type substrates and may be utilized as part of an air barrier system.
.1 Noncementitious air/moisture and vapour barrier: Factory mixed, fully formulated water-based material for use over gypsum or cement based sheathings where a vapour barrier material is desired (not for use over wood sheathings). Standard of Acceptance: Dryvit Airsulation.

.2 Noncementitious air and moisture barrier (vapour permeable): a factory mixed, fully formulated water-based material for use over all sheathing types. May be used over masonry type substrates following levelling coat (wet). Standard of Acceptance: Dryvit Backstop™ NT:

.3 Cementitious: A liquid polymer-based admixture, field-mixed with equal parts Type 10 Portland cement. May be used over gypsum and cement based sheathings as well as masonry and concrete. Standard of Acceptance: Dryvit Dryflex

.2 Tape: An open weave fibreglass mesh tape with pressure sensitive adhesive available in rolls 102 mm wide x 91 m long. For noncementitious air and moisture barrier NT, mesh specified for liquid flashing may be used on flat joints. Standard of Acceptance: Dryvit Grid Tape™.

.3 Flashing Materials: Used to protect substrate edges at terminations.

.1 Liquid Applied: An extremely flexible water-based polymer material, ready for use. Standard of Acceptance: Dryvit AquaFlash and AquaFlash Mesh

.2 Sheet Type: Flashing Tape and Surface Conditioner

.1 High density, polyethylene film backed with a rubberized asphalt adhesive available in rolls 102 mm, 152 mm and 229 mm wide x 23 m long. Standard of Acceptance: Dryvit Flashing Tape™.

.2 Water-based surface conditioner and adhesion promoter for the flashing tape. Standard of Acceptance: Dryvit Flashing Tape Surface Conditioner™.

.4 Adhesives: Used to adhere the EPS to the air/water-resistive barrier, compatible with the water-resistive barrier and the EPS.

.1 Cementitious: A liquid polymer-based material, which is field mixed with Portland cement. Standard of Acceptance: Dryvit Primus or Genesis

.2 Factory Blended: A dry blend cementitious, copolymer-based product, field mixed with water. Standard of Acceptance: Dryvit Primus DM, Genesis DM, Genesis DMS, Rapidry DM™ 35-50 or Rapidry DM 50-75

.5 Insulation Board: Expanded Polystyrene meeting the System Manufacturer's specification for insulation board

.1 Thickness: Minimum 51 mm.

.2 The back side of the insulation board shall have 10 mm x 25 mm grooves running vertically at 305 mm o.c.

.3 The insulation board shall be manufactured by a board supplier listed by the System Manufacturer.

.6 Insulation Board Closure Blocks: Expanded polystyrene meeting the System Manufacturer's specification for insulation board, The closure blocks shall measure a minimum of 152 mm in height.

.7 Starter Strip: 51 mm x 152 mm x 1.2 m piece of aged expanded polystyrene configured to receive the drainage devices. Install at the base of all walls, at base of horizontal terminations, and heads of windows and other openings.

.8 Vent Assembly: 51 mm x 152 mm x 305 mm piece of aged expanded polystyrene, capable of draining water, configured to contain a formed aggregate matrix material and receive the drainage device. Install at the base of walls and the base of horizontal terminations

.9 Drainage Device: Located on top of the starter strip within the "V" shaped moulded chamfer and fabricated in-situ using specified reinforced liquid-applied flashing materials. Standard of Acceptance: Dryvit AquaDuct.

.10 Base Coat: Compatible with the EPS insulation board and reinforcing meshes.

.1 Cementitious: Liquid polymer-based material, which is field mixed with Portland cement. Standard of Acceptance: Dryvit Primus or Genesis.

.2 Noncementitious: Factory-mixed, fully formulated, water-based product. Standard of

Acceptance: Dryvit NCB™ (for use in combustible construction only).

.3 Factory Blended: Dry blend cementitious, copolymer-based product, field mixed with water. Standard of Acceptance: Dryvit Primus DM, Genesis DM, Genesis DMS, Rapidry DM 35-50 or Rapidry DM 50-75.

.4 Noncombustible: For use where a non combustible system is required. Standard of Acceptance: Dryvit Primus DM.

.11 Reinforcing Mesh: Balanced, open weave, glass fibre fabric, treated for compatibility with other system materials. Select appropriate weight and tensile strength for required impact resistance. Refer to Performance criteria. Standard of Acceptance: Dryvit Standard, Standard Plus, Intermediate, Panzer 15, Panzer 20, Detail and Corner Mesh.

.1 At minimum standard mesh shall be used over the entire wall area in accordance with the System Manufacturer's EIFS application instructions. Minimum mesh/mesh overlap shall be 75 mm.

.12 Finish: Type, colour and texture as selected by the Consultant from the System Manufacturer's complete colour and texture range, as follows:

.1 Dirt Pickup Resistance (DPR): Water-based, acrylic finish with integral colour and texture, and formulated with DPR chemistry: Standard of Acceptance: Dryvit products as follows:

.1 Open-texture: Quarzputz® DPR.
.2 Medium texture: Sandblast® DPR.
.3 Fine texture: Freestyle® DPR
.4 Pebble texture: Sandpebble™ DPR.
.5 Fine pebble texture: Sandpebble Fine DPR:

.2 Water-based, lightweight acrylic coating with integral colour and texture, and formulated with DPR chemistry. Standard of Acceptance: Dryvit products as follows:

.1 Open-texture. Standard of Acceptance: Dryvit Quarzputz E.
.2 Pebble texture: Sandpebble E.
.3 Fine pebble texture: Sandpebble Fine E.

.3 Specialty: Factory mixed, water-based acrylic: Standard of Acceptance: Dryvit products as follows:

.1 Multi-colored quartz aggregate with a flamed granite appearance: Ameristone.
.2 Ceramically coloured quartz aggregate: Stone Mist™.
.3 Acrylic polymer-based finish used in conjunction with a proprietary template system to create the look of stone, brick, slate or tile: Custom Brick.

.4 100% acrylic-based finish with large mica chips and multi-colored quartz aggregates: TerraNeo.
.5 A premixed, 100% acrylic-based finish designed to replicate the appearance of limestone blocks: Lymestone.

.4 Elastomeric Dirt Pickup Resistance (DPR): Water-based, elastomeric acrylic finishes with integral colour and texture, and formulated with DPR chemistry: Standard of Acceptance: Dryvit products as follows:

.1 Open-texture: Weatherlastic™ Quarzputz.
.2 Pebble texture: Weatherlastic Sandpebble.
.3 Fine pebble texture: Weatherlastic Sandpebble Fine.
.4 Adobe texture: Weatherlastic Adobe

.5 Proven Mildew Resistance (PMR): Water-based, acrylic finish with integral colour and texture and formulated with PMR. Standard of Acceptance: Dryvit Medallion Series PMR™. Selection to be made by the Consultant from the following products:

.1 Quarzputz PMR
.2 Sandblast PMR
.3 Freestyle PMR
.4 Sandpebble PMR
.5 Sandpebble Fine PMR

.6 Coatings, Primers and Sealers: Standard of Acceptance: Selection to be made by the Consultant from the following Dryvit products:
- .1 Demandit
- .2 Weatherlastic Smooth
- .3 Tuscan Glaze™
- .4 Revyvit
- .5 Colour Prime™
- .6 Prymit™
- .7 SealClear™

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 the substrate:
- .1 Is of a type acceptable to the EIFS System Manufacturer.
- .2 Is flat within 6.4 mm in a 1.2 m radius.
- .3 Is sound, dry, connections are tight; has no surface voids, projections, or other conditions that may interfere with the EIFS installation or performance.

.3 Ensure that all flashings and other waterproofing details which are required prior to the EIFS application have been completed. Additionally, ensure that:
- .1 Metal roof flashing has been installed to the satisfaction of the EIFS System Manufacturer.
- .2 Openings are flashed in accordance with the System Manufacturer's recommended installation details or as otherwise necessary to prevent water penetration.
- .3 Chimneys, balconies and decks have been properly flashed.
- .4 Windows, doors, etc. are installed and flashed in accordance with manufacturer's requirements and the System Manufacturer's recommended installation details.

.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 Protect the EIFS by permanent or temporary means from inclement weather and other sources of damage prior to, during, and following application until completely dry.

.2 Protect adjoining work and property during EIFS installation.

.3 Prepare the substrate so as to be free of foreign materials, such as oil, dust, dirt, form-release agents, efflorescence, paint, wax, water repellents, moisture, frost, and any other condition that may inhibit adhesion.

3.3 INSTALLATION

.1 Install the system in accordance with the System Manufacturer's application instructions.

.2 The overall minimum base coat thickness shall be sufficient to fully embed the mesh. The recommended method is to apply the base coat in 2 passes.

.3 Do not apply sealant directly to textured finishes or base coat surfaces. Coat EIFS surfaces in contact with sealant shall be coated with manufacturer's recommended products.

.4 Install high impact meshes as specified at ground level, high traffic areas and other areas exposed to or susceptible to impact damage.

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.

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

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

3.5 PROTECTION

.1 Protect the EIFS from inclement weather and other sources of damage until dry and permanent protection in the form of flashings, sealants, etc. are installed.

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 sheet vapour retarders under the concrete floor slab-on-grade, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Work:
- .1 Section 03 30 00 - Cast-in-Place Concrete.

1.3 REFERENCES

.1 American Concrete Institute (ACI):
- .1 ACI 302.1R-04, Guide for Concrete Floor and Slab Construction.
- .2 ACI 302.2R-06, Concrete Slabs that Receive Moisture-Sensitive Flooring Materials Slab Combination Pack.

.2 American Society for Testing and Materials (ASTM):
- .1 ASTM D1709-09, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
- .2 ASTM E96-10/E96M-10, Standard Test Methods for Water Vapor Transmission of Materials.
- .3 ASTM E154-08a, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
- .4 ASTM E1643-11, Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- .5 ASTM E1745-11, Standard Specification for Water Vapor Retarders Used in Contact with Soil.

.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 Submit manufacturer's product data on sheet vapour retarder and joint tape specified, including data substantiating that materials comply with specified requirements.
- .2 Include installation instructions.
- .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 Samples: Submit duplicate minimum 150 mm x 150 mm samples of sheet material and minimum 1 m joint tape.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to project site in original packages with seals unbroken, labelled with manufacturer's name, product, date of manufacturer, and directions for storage.

.2 Store materials in their original undamaged packages in a clean, dry, protected location and within the temperature range required by the material manufacturer. Protect stored materials from direct sunlight.

.3 Stack material on smooth ground or wood platform to eliminate warping.

.4 Protect materials during handling and application to prevent damage or contamination.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Be advised that these products are not intended for uses subject to abuse or permanent exposure to ultra violet light.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on the specified products.

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

2.2 MATERIALS

.1 Sheet vapour retarder / moisture barrier: 0.38 mm thick polyolefin-based vapour barrier/retarder specifically formulated for use under concrete slab-on-grade, with the following minimum performance characteristics:

.1	Water vapour permeance (ASTM E96, Water Method):	0.0093 Perms
.2	Puncture resistance (ASTM D1709, Method B):	> 4300 Grams
.3	Tensile strength (ASTM E154, Section 9):	84 lb force/inch
.4	Water vapour permeance (after wetting out), drying out and after long term soaking (ASTM E154, Section 8 and ASTM E96, Procedure B):	0.0136 Perms

.5 Water vapour permeance, resistance to plastic flow and elevated temperature (ASTM E154, Section 11 and ASTM E96, Procedure B): 0.0121 Perms

.6 Water vapour permeance, effect of low temperature and flexibility (ASTM E154, Section 12 and ASTM E96, Procedure B): 0.0140 Perms

.7 Water vapour permeance, resistance to deterioration from organisms and substances in contacting soil (ASTM E154, Section 13 and ASTM E96, Procedure B): 0.0123 Perms

.8 Material shall meet or exceed all requirements of ASTM E1745, Class A, B and C.

.9 Material shall meet or exceed the vapour retarder / moisture barrier recommendations of ACI 302.2R.

.10 Standard of acceptance:

.1 Permiator 15 mil by W. R. Meadows.

.2 Stego Wrap Vapour Barrier by Stego Industries LLC.

2.3 ACCESSORIES

.1 Seam tape: Tape with pressure sensitive adhesive, as recommended by the membrane manufacturer, 100 mm wide.

.2 Pointing mastic: As recommended by the membrane manufacturer.

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 services are installed and have been reviewed and accepted by the Consultant prior to installation of the vapour retarder.

.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 SURFACE PREPARATION

.1 Prepare surfaces in accordance with manufacturers instructions.

.2 For under-slab-on-grade application, level, tamp, or roll earth or granular material beneath the slab base in accordance with ASTM E1643. and ACI 302.1R prior to placement of the membrane.

3.3 INSTALLATION - UNDER SLAB-ON-GRADE

.1 Install vapour retarder / moisture barrier membrane in accordance with the manufacturer's instructions.

.2 Unroll membrane over the area where the slab is to be poured. Cut to size. The membrane must completely cover the pour area. Use sheets of largest practical size to minimize joints.

.3 Overlap all joints/seams, both side and end minimum 150 and tape using 100 mm wide tape. The tape area of adhesion must be free from dust, dirt, and moisture to allow maximum adhesion of the pressure-sensitive tape.

.4 Before placing concrete slab, ensure all penetrations, block outs, and damaged areas are repaired/addressed.

.5 Seal all protrusions. Cut a slit around pipes, ductwork, rebar, and wire penetrations to place the initial layer of membrane. To further protect the concrete slab from external moisture sources, use a piece of membrane and place a collar around this as well.
- .1 Cut a piece of membrane minimum 300 mm wide x $1^{1}/_{2}$ times the pipe circumference. With a roofer's knife or scissors, cut "fingers" half the width of the film.
- .2 Wrap around and tape the collar onto the pipe and completely tape fingers to the bottom layer of membrane.

.6 Inspect membrane for continuity. Repair damage to the membrane occurring during or after installation.
- .1 Cut a piece of membrane large enough to cover any damage by a minimum overlap of 150 mm in all directions.
- .2 Clean all adhesion areas of dust, dirt, and moisture.
- .3 Tape down all edges using the manufacturer's recommended 100 mm wide tape.

.7 Leave ready to receive concrete slab, poured directly on the vapour retarder / moisture barrier membrane.

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.

.2 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 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 supply and install a fluid-applied air/moisture barrier system, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
  .1 Section 04 20 00 - Unit Masonry.
  .2 Section 07 21 00 - Building Insulation.
  .3 Section 07 21 19 - Urethane Foam Insulating Sealant.
  .4 Section 07 52 16 - SBS Modified Bituminous Roofing
  .5 Section 08 11 13 - Steel Doors and Frames.
  .6 Section 08 36 13 - Glazed Aluminum Overhead Doors.
  .7 Section 08 41 13 - Aluminum Framed Entrances.
  .8 Section 08 53 13 - Vinyl Windows
  .9 Section 09 21 16 - Gypsum Board Assemblies.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
  .1 ASTM D412-06a(2013) plus Adjunct, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers.
  .2 ASTM E96/E96M-14, Standard Test Methods for Water Vapor Transmission of Materials.

.2 Canadian Standards Association (CSA):
  .1 CAN/CSA-ISO 9001-09, Quality Management Systems - Requirements.

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

1.4 QUALIFICATIONS

.1 The air/moisture barrier membrane manufacturer shall be ISO 9002 certified. Upon request from the Consultant, submit copy of manufacturer certificate indicating that all products supplied in this specification conform to IS0 9002.

.2 The work of this Section shall be executed by a company approved by the material manufacturer as an applicator, using skilled tradesmen who are fully familiar with the application of air/moisture barrier membranes and are experienced in this work.

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 product data for all components of the system.
- .2 Include installation instructions for the membrane air/moisture barrier transition strips.
- .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.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 No installation work shall be performed during rainy or inclement weather or on frost covered or wet surfaces.

1.7 SEQUENCING AND COORDINATION

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

.2 Coordinate work of this section with related other sections to ensure continuity of the air seal.

1.8 DELIVERY, STORAGE AND HANDLING

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

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

.3 Comply with the recommendations of the applicable Material Safety Data Sheets with respect to the safe storage and handling of materials.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 GENERAL

.1 This specification is based on Blue Shield air/moisture barrier system by Durex.

.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.

.3 Obtain all components of the system from a single manufacturer.

2.2 MATERIALS

.1 Air/moisture barrier: Single-component, liquid applied, water-based, copolymer rubber air barrier and waterproofing membrane. Applied by roller, trowel or spray equipment. When cured it shall form a tough, seamless, elastomeric membrane, which is resistant to air leakage and water ingress under hydrostatic pressure.

.1 Physical Properties:

.1 Product type: Water based copolymer

.2 Appearance: Light blue viscous material in its liquid state

.3 Specific Gravity: 0.98

.4 Ph level: 6.0

.5 Vapour Pressure: 17 mmHg @ 20°C

.6 Boiling Point: approx. 100°C

.7 Application Temperature: Above 5°C

.2 Performance Characteristics:

.1 Bond Strength: 0.51 MPa

.2 Tensile Strength (ASTM D412): 2.73 MPa

.3 Elongation (ASTM D412): 340%

.4 Plastic Flow: No sagging at 60°C for 5 hours

.5 Air Leakage: Type III Air Barrier

Time	Aw kg/(m^2.s$^{1/2}$)	Rating
24 hrs	0.001	Pass
48 hrs	0.001	Pass
72 hrs	0.001	Pass

.6 Water Vapour Transmission (ASTM E96 Procedure B): 48 ng/Pa.s.m^2

.7 When used as an air barrier application thickness should not exceed 1.0 mm Net
0.39 mm Dry

.3 Standard of acceptance: Durex Blue Shield

.2 Transitions: As recommended by the system manufacturer for each specific application:

.1 Self-adhering, air and moisture barrier transition membrane used in conjunction with the air/moisture barrier product to bridge inter-face gaps and to create continuity in the water penetration barrier within a wall assembly.

.1 0.76 mm SBS modified rubberized asphalt membrane with a polyester top surface to enhance adhesion when the manufacturer's recommended insulation adhesive is applied directly to this surface.

.1 Suitable for application over gypsum board, wood, metal, polystyrene and polyethylene surfaces.

.2 Self-sealing when penetrated with mechanical fasteners.

.3 Use to seal window and door openings, joints in dissimilar substrates and wherever water infiltration may be a concern.

.4 Standard of acceptance: Durex EIFS Tape.

.2 Thermally set, spunbonded polyester non-woven fabric made up of 100% continuous polyester filament fibres that are randomly arranged and reinforced with a 5 x 5 polyester scrim for added strength and stability.

.1 High tensile and tear strength,
.2 Wets out well with both air/moisture barrier material
.3 Non-ravelling, moisture, rot and mildew resistant, lightweight, good sunlight resistance and good elongation and recovery properties.
.4 Compatible with oxidized asphalt and cold tar bitumen for use in hot mop system. Used in conjunction with air/moisture barrier materials bridge interface gaps and to create continuity in the water penetration barrier within a wall assembly.
.5 Standard of acceptance: Durex Barrier Seam Tape.

.3 Primer: As recommended by the system manufacturer for specific substrates. Standard of acceptance: Durex Flex-Seal Primer.

Part 3 Execution

3.1 EXAMINATION

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

.2 Ensure that surfaces are dry and provide a continuous, sound, compatible substrate for the membrane.

.3 Ensure that substrates are clean of oil or excess dust; all masonry joints struck flush; all concrete surfaces free of large voids, spalled areas or sharp protrusions.

.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 Clean substrate surfaces to receive air/moisture barrier in accordance with manufacturer's instructions. Remove loose or foreign matter which might impair adhesion of materials.

.2 Substrate must be dry, clean, sound and free of weak and powdery surfaces, dust, dirt, oil, grease and other deleterious materials, which may be detrimental to the air/moisture barrier during or after curing.

3.3 AIR/MOISTURE BARRIER APPLICATION

.1 Coordinate with all trades to ensure the continuity of the air/moisture seal.

.2 Transitions: Install specified EIFS tape or seam tape according to the manufacturer's recommendations for each specific condition at interfaces with adjacent construction and at all

locations where required to maintain the continuity of the air/moisture barrier throughout the building envelope.

.1 Apply tape at all inter-face gaps throughout the wall assembly, such as window and door openings, expansion joints, dissimilar substrates, metal flashing, though-wall penetrations and wherever water infiltration is possible.

.2 Tape should be applied when the temperature is above 7°C. For application below this temperature the material must be stored in a warm area for at least 24 hours prior to application.

.3 Apply primer to substrates to maximize adhesion.

.4 Cut a piece of tape in a length that can be easily handled. Begin the application by removing approximately 300 mm of the release paper and centre the tape over the area being sealed.

.5 Firmly roll the tape against the surface and continue pulling off the release tape in place. Rolling the tape will help insure a watertight seal and minimize trapping air beneath the tape.

.6 Do not leave the membrane exposed to direct sunlight for more than six weeks.

.3 Do not substitute or compensate the air/moisture barrier material with water or other additives.

.4 Apply air/moisture barrier to manufacturer's instructions. The air/moisture barrier may be applied by roller, trowel or spray.

.5 For spray application, use a conventional airless unit with a 0.025 tip and a minimum of 3,000 psi pressure.

.6 Allow material to dry at an air and surface temperature of 2°C or higher.

.7 Curing time will differ depending on specific application conditions. Relative humidity, temperature and airflow will effect curing time. Average conditions and standard thickness will achieve tack-free film in 1 to 3 hours and full cure within 7 days.

3.4 CLEAN UP

.1 The specified product is a water-based emulsion and does not require the use of solvents for cleaning up.

.1 Use light soap and water to clean uncured material.

.2 Cured material is best removed with xylol or by mechanical means.

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

.3 Clean any overspray, drippage and spills of air/moisture barrier material from adjacent surfaces.

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

3.5 PROTECTION OF FINISHED WORK

.1 Protect finished Work from damage. Do not permit adjacent work to damage the work of this section.

.2 Install finishing materials as soon as possible after the air/moisture barrier membrane has been installed and reviewed by the Consultant.

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 supply and install asphalt shingles, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 06 10 00 - Rough Carpentry: Plywood roof sheathing.
- .2 Section 07 62 00 - Sheet Metal Flashing and Trim.

1.3 REFERENCES

.1 Canadian Standards Association (CSA):
- .1 CSA-A123.1-05/A123.5-05, Asphalt Shingles Made from Organic Felt and Surfaced with Mineral Granules / Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
- .2 CSA-A123.3-05(R2010), Asphalt Saturated Organic Roofing Felt.
- .3 CSA-A123.51-M85(R2011), Asphalt Shingle Application on Roof Slopes 1:3 and Steeper.
- .4 CSA-B111-1974(R2003), Wire Nails, Spikes and Staples.

.2 Canadian General Specification Board (CGSB):
- .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

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 full size samples of specified shingles.

1.5 STORAGE AND HANDLING

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

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

.3 Provide and maintain dry, off-ground weatherproof storage.

.4 Remove from storage only in quantities required for same day use.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MATERIALS

.1 Asphalt shingles: to CSA A123.1, 30-year life expectancy, type and colour to be selected by the Consultant.

.2 Underlayment:
- .1 Self-adhesive, self-sealing, composite membrane where indicated. Standard of acceptance: "Ice and Watershield" by Grace Canada Ltd.
- .2 Sheathing paper where not otherwise indicated: to CAN/CGSB-51.32, single ply, perforated.
- .3 Underlayment for Metal Flashing: No. 15 non-perforated asphalt felt to CSA A123.3.

.3 Nails: to CSA B111, large headed roofing nails, galvanized steel, sufficient length to penetrate 19 mm into deck.

.4 Plastic cement: As recommended by the shingle manufacturer.

.5 PVC drip edge: extruded profile of unplasticized polyvinyl chloride of minimum thickness of 0.8 mm.

2.2 PREFINISHED FASCIAS, SOFFITS AND FLASHINGS

.1 Refer to Section 07 62 00 "Sheet Metal Flashing and Trim".

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 Ensure that roof deck surface is properly fastened and supported.

.3 Deck shall be clean and dry and free from ice, snow or other debris.

.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 UNDERLAYMENT

.1 Provide self-adhesive, self-sealing membrane underlayment where indicated:
  .1 Roll out membrane and properly align with edge of roof. Reroll, peel back 600 mm and carefully press membrane into place. Continue by peeling release paper from under the membrane until full roll is installed.
  .2 Lap all edges minimum 100 mm and roll firmly. At end laps, lay 200 mm wide self-adhesive lap strip on surface being covered and press firmly into place. Butt ends of pieces being joined over centre of lap strip and ensure 100 mm coverage. Firmly press and roll into place.

.2 Where not otherwise indicated, provide sheathing paper underlayment. Lap all edges minimum 150 mm and staple temporarily in place prior ti installing shingles. Install progressively as shingler installation proceeds.

3.3 SHINGLE APPLICATION

.1 Do asphalt shingle work in accordance with CSA-A123.51 and applicable CRCA Specifications, except where specified otherwise.

.2 Install drip edge along eaves, overhanging 12 mm, with minimum 50 mm flange extending onto roof decking. Nail to deck at 400 mm oc.

.3 Starter strip shall be a row of shingles, granule side up, facing tabs up the roof, overhanging the eave edge and nailed along the bottom edge at 300 mm o.c.

.4 For strip shingles, use a minimum of 4 nails per shingle and apply with a maximum exposure equal to the height of the cut-outs with nails located 25 mm to 38 mm from each end of each shingle and a minimum of 16 mm above the top of the cut-outs.

.5 Cap all hips and ridges not requiring vents, using strip shingles cut into individual units or individual shingles manufactured for this purpose. Apply capping avoiding exposed nails, 125 mm to the weather and in the direction opposite to the prevailing winds.

.6 Install bottom step flashing (soaker base flashing) interleafed between shingles at vertical junctions.

3.4 METAL FLASHINGS

.1 Provide specified asphalt felt underlayment under all metal flashings.

.2 Protect the intersection of shingle roofs and vertical walls with sheet metal flashing that extends not less than 150 mm out onto the roof and not less than 200 mm up the vertical wall. Install flashing so as to extend behind the wall cladding and its underlying sheathing paper.

.3 Step sheet metal flashing along the slopes of a roof so that there is at least 75 mm headlap in both lower flashing and counter flashing.

.4 Install throw-off flashings (half crickets) at the bottom of all sloping roofs, next to vertical walls and at the intersection of sloping roofs where water might otherwise be trapped, to direct water to discharge at the eaves, away from the building face.

.5 Install open valley flashing at roof intersections of minimum 600 mm wide sheet metal, minimum 100 mm exposed each side of intersection.

.6 Starter strip shall be a 300 mm minimum width of mineral surfaces roll roofing, or a row of shingles, granule side up, facing tabs up the roof, overhanging the eave edge and nailed along the bottom edge at 300 mm o.c.

.7 For strip shingles, use a minimum of 4 nails per shingle and apply with a maximum exposure equal to the height of the cut-outs with nails located 25 mm to 38 mm from each end of each shingle and a minimum of 16 mm above the top of the cut-outs.

.8 All hips and ridges not requiring vents shall be capped using strip shingles cut into individual units or individual shingles manufactured for this purpose. Capping shall be applied avoiding exposed nails, 125 mm to the weather and in the direction opposite to the prevailing winds.

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 sealant or plastic cement from adjacent surfaces.

.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, including General and Supplementary Conditions and Division 01 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 provide and install mineral fibre cementitious panels, as indicated on the drawings, as specified herein and as required for a complete project.
- .2 The work includes two types of siding:
  - .1 Panel siding
  - .2 Horizontal lap siding.

.2 Related Work:
- .1 Section 06 10 00 - Rough Carpentry.
- .2 Section 07 21 00 - Building Insulation.
- .3 Section 07 27 10 - Membrane Air/Moisture Barrier.
- .4 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .5 Section 07 92 00 - Joint Sealants.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM C1185-08(2012), Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet Roofing and Siding Shingles and Clapboards.
- .2 ASTM E136-12, Standard Test Method for Behaviour of Materials in a Vertical Tube Furnace at 750°C.

.2 Canadian Standards Association (CSA):
- .1 CSA-B111-1974(R2003), Wire Nails, Spikes and Staples.

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:
- .1 Submit a complete range of colour samples for the Consultant's selection.
- .2 Submit duplicate sample panels, minimum 300 mm x 300 mm in each of the selected colours.
- .3 Submit duplicate samples of lap siding, minimum 300 mm long in each of the selected colours.

.3 Shop drawings:
- .1 Provide dimensioned drawings indicating panel layout and joints, metal furring and methods of attachment to structure, joint details and profiles and other pertinent information.
- .2 Include related metal flashing profiles.
- .3 The panel installation, including all related connections and fastenings, shall be designed by a structural engineer licensed to practise in the Province of Ontario. Each shop drawing submitted shall bear the stamp and signature of the aforesaid structural engineer.

1.5 STORAGE AND HANDLING

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

.2 Lay flat on a smooth, level surface.

.3 Protect edges and corners to prevent chipping.

.4 Store under cover and keep dry prior to installing. If material should become wet, allow to dry thoroughly before installing.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

1.7 WARRANTY

.1 In addition to the twelve (12) months warranty called for in the General Conditions of the Contract, provide manufacturer's limited transferable product warranty for 50 years from the date of Substantial Performance.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on cement fibre board products by James Hardie.

.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 MINERAL FIBRE CEMENT BOARD SIDING

.1 Autoclaved manufactured panels composed of Portland cement, ground sand, cellulose fibre, select additives and water. Acceptable manufacturer: James Hardie:
- .1 Panel siding:
  - .1 Standard of acceptance: HardiePanel
  - .2 Size: 1219 mm x 2438 mm x 13 mm thick (cut to sizes required - refer to drawings).
  - .3 Texture and colour to be selected by the Consultant.
- .2 Horizontal lap siding:
  - .1 Standard of acceptance: HardiePlank HL5 lap
  - .2 Panel width: 157 mm
  - .3 Panel exposure: 127 mm
  - .4 Use panels of the longest possible length to minimize end joints.
  - .5 Texture and colour to be selected by the Consultant.

.2 Trim to match panels, profiles to suit application. Standard of addeptance: HardieTrim.

.3 Accessories:
- .1 Fasteners: as recommended by the panel manufacturer. Exposed fasteners to match panel finish.
- .2 Galvanized Steel Furring: 0.9 mm (20 ga) galvanized sheet steel to ASTM A653, Z350 coating designation, profiles as indicated.
- .3 Metal flashings as specified in Section 07 62 00.
- .4 Sealants as specified in Section 07 92 00.

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 membrane air/moisture is properly in place, undamaged, and have been reviewed and accepted by the Consultant.

.3 Verify dimensions on site and indicate on the shop drawings.

.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 INSTALLATION

.1 Install siding in strict accordance with the reviewed and accepted shop drawings and the manufacturer's printed instructions.

.2 Install metal furring and securely attach to structure. Install wall insulation progressively with the furring. Coordinate with Section 07 21 00 "Building Insulation".

.3 Install siding panels according to the layout indicated, plumb, level, true to line and with consistent joints.

.4 Install lap siding in accordance with the manufacturer's installation instructions. Finish joints as indicated on the reviewed and accepted shop drawings. Install panels in moderate contact at end joints and provide flexible flashings of weather barrier material, in accordance with the manufacturer's recommendations behind each end joint.

.5 All work to be screw-fastened. Nails are not permitted. Locate fasteners minimum 10 mm back from panel edge.

.6 Use the number and type of fasteners indicated on the shop drawings. Locate fasteners minimum 10 mm back from panel edge, in proper alignment and equally spaced. Fastener pattern to be consistent throughout the installation.

.7 Finish joints as indicated on the reviewed and accepted shop drawings.

.8 Install matching trim as indicated and as required by site conditions and acceptable to the Consultant.

.9 Coordinate with Section 07 62 00 "Sheet Metal Flashing and Trim" and install metal flashings and trim in locations as shown on the reviewed and accepted shop drawings and as required for a complete installation.

.10 Coordinate with Section 07 92 00 "Joint Sealants" and caulk in locations as shown on the reviewed and accepted shop drawings and as required for a complete installation in accordance with the manufacturer's instructions.

3.3 CLEANING

.1 Repair and touch up damaged surfaces to the satisfaction of the Consultant. Replace any components deemed by the Consultant to be irreparable.

.2 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.

.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, 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 a modified bituminous sheet membrane roofing system, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Work:
- .1 Section 05 31 00 - Steel Decking
- .2 Section 06 10 00 - Rough Carpentry.
- .3 Section 07 27 10 - Membrane Air/Vapour Barrier.
- .4 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .5 Section 07 92 00 - Joint Sealants.
- .6 Division 22 - Plumbing.
- .7 Division 23 - Heating, Ventilating and Air Conditioning (HVAC).

1.3 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM C1177/C1177M-13, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .2 ASTM D5147-11a/D5147M-11a, Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
- .3 ASTM E84-14, Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 Canadian General Standards Board (CGSB):
- .1 CGSB 37-GP-56M, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing - Amendment No. 1.

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

.4 Canadian Roofing Contractors Association (CRCA): Roofing Specifications.

.5 Canadian Standards Association (CSA):
- .1 CSA-A123.4-04(R2013), Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
- .2 CSA-B111-1974(R2003), Wire Nails, Spikes and Staples.
- .3 CAN/CSA-ISO 9001-09, Quality Management Systems - Requirements.

.6 Ontario Industrial Roofing Contractors Association (OIRCA)

.7 Underwriters' Laboratories of Canada (ULC):
.1 CAN/ULC-S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

1.4 QUALIFICATIONS

.1 The membrane manufacturer shall be IS0 9001 certified. Upon request from the Consultant, submit copy of manufacturer certificate indicating that all products supplied in this specification conform to IS0 9001.

.2 The Roofing Contractor shall be licensed by the material manufacturer as an approved installer and shall have a minimum of ten years documented successful experience in the installation of modified bituminous roofing systems of the type required for this project.

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

.4 Applicable CRCA and/or the OIRCA standards shall apply to the work of this Section.

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 Source Quality Control:
.1 Upon request from the Consultant, the roofing membrane manufacturer shall supply, at his expense, the results of mechanical and chemical testing performed on the materials supplied.
.2 The tests shall be performed to certify compliance with CGSB 37-GP-56M.

.3 Product Data:
.1 Provide installation instructions for the roofing materials specified.
.2 Include manufacturer's material safety data sheets for the safe handling of the specified materials and products, in accordance with WHMIS requirements.

1.6 WARRANTY AND INSURANCE

.1 Membrane manufacturer's warranty: In addition to the 12 months warranty prescribed in the General Conditions of the Contract, provide a written warranty, signed and issued in the name of the Owner, stating that the membrane manufacturer will guarantee to repair at his own expense any leaks in the roofing membrane or flashing membrane resulting from defects in the manufacture of the membrane and/or from faulty workmanship for a period of ten (10) years from the date of the Certificate of Substantial Completion.

.2 Contractor's warranty: In addition to the 12 months warranty prescribed by the General Conditions of the Contract, provide a written warranty, signed and issued in the name of the Owner, stating that the Contractor will guarantee to repair at his own expense any leaks in the roofing membrane or flashing membrane resulting from faulty workmanship, in accordance with the General

Conditions of the Contract but for a period of two (2) years from the date of the Certificate of Substantial Completion.

1.7 MANUFACTURER'S REPRESENTATIVE

.1 The work shall be carried out under the general supervision of a representative of the roofing material manufacturer.

.2 At all times, the Contractor shall permit and facilitate access to the work site by the said manufacturer's representative.

1.8 FIELD QUALITY CONTROL

.1 Within 72 hours before the commencement of roofing operations, convene a preinstallation meeting. The following parties shall be in attendance:
- .1 Contractor
- .2 Consultant
- .3 Roofing Inspector
- .4 Roof membrane manufacturer's representative
- .5 Roofing Contractor

.2 Subsequently, give two (2) working days prior notice to the Roofing Inspector of the commencement of each phase of the work, and provide him with materials and installation information as required.

.3 On completion of each portion of the roof, conduct, in the presence of and under the direction of the Consultant, a flood test of that portion. Ensure that the entire roof area has been subjected to a flood test when the installation is complete.

.4 Cooperate with the Roofing Inspector and afford all facilities necessary to permit full inspection of the work and testing of materials prior to and during their use and during the warranty period. Act immediately on instructions given by the Consultant.

1.9 DELIVERY AND STORAGE

.1 All materials shall be delivered and stored in their original packaging, bearing the manufacturer's name, related standards and any other specification or reference accepted as standard.

.2 Adequately protect and permanently store all materials in a dry, well ventilated and weatherproof location. Remove from this location only materials to be used the same day. During winter, store materials in a heated location with a 10 deg.C minimum temperature. Remove only as needed for immediate use. Keep materials away from open flame or welding sparks.

.3 Carefully store materials delivered in rolls on end, with salvage edges up. Store metal flashings in such a way as to prevent wrinkling, twisting, scratches and other damage.

.4 Avoid stockpiling materials on decks in a way which could cause overloading.

1.10 PROTECTION

.1 During roofing work, protect exposed surfaces of finished walls with tarps in order to prevent damage. Assume full responsibility for damage to other work caused by the work of this Section.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on modified bituminous roofing systems by Soprema Inc.

.2 Subject to compliance with the specification requirements, equivalent products by the following manufacturers are acceptable alternatives:
- .1 IKO Industries Ltd.
- .2 Henry Co.
- .3 The Garland Co. Inc.

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

.4 All components of the roofing system shall be obtained from or approved by a single manufacturer.

2.2 DECK SHEATHING

.1 Non-structural, glass mat faced, gypsum panel with water-resistant core to ASTM C1177, 1219 mm wide x 2438 mm long x 13 mm thick, ends and edges square. Standard of acceptance: Dens-Deck by G-P Gypsum Corp.

.2 Sheathing adhesive as recommended by the sheathing manufacturer. Standard of acceptance: Coltack by Soprema.

.3 Fasteners: Size and type in accordance with FM requirements and the membrane manufacturer's recommendations. Fasteners through steel deck are not permitted in areas where the underside of the deck is exposed to sight.

2.3 ASPHALT PRIMER

.1 Black bituminous varnish comprising asphalt modified bitumen with thermoplastic polymers and volatile solvents, as recommended by the roofing system manufacturer for the specific substrate.

.2 Apply primer to each surface to be covered with membrane in accordance with the manufacturer's instructions.

2.4 BITUMEN

.1 Type II and III asphalt to CSA-A123.4 bitumen with thermoplastic polymers and volatile solvents.

2.5 VAPOUR RETARDER

.1 Modified bituminous membrane composed of heavy glass mat reinforcement, and SBS modified bitumen. Under face to be self-adhesive with silicone release film and top face to be sanded. Minimum thickness of 3.0 mm. Standard of acceptance: Soprema Sopralene Stick Adhesive.
- .1 Apply membrane by self-adhesion on primed substrate.
- .2 Components:
  - .1 Reinforcement: Glass fibre 130 g/m^2.
  - .2 Modified bitumen: Mix of selected bitumen and SBS thermoplastic polymer.

2.6 INSULATION

.1 Board Insulation: Closed-cell polyisocyanurate foam insulation board, integrally laminated to inorganic/organic felt facers, to CAN/ULC-S704, Type 3, CFC-free and conforming to Environment Canada Ozone-Depleting Substances regulations, minimum RSI 1.04 M2.°C/W per 25 mm thickness, maximum board size 1219 mm x 1219 mm; thickness as indicated.

.2 Sloped insulation: Factory pre-engineered tapered polyisocyanurate sloped insulation compatible with the roof membrane system. Provide slopes at roof drain areas as required to obtain minimum 1:50 roof slopes, including the upslope side of HVAC equipment and other curbs to divert run-off from accumulating behind the units.

.3 Protection Board: Semi-rigid protection board composed of a mineral-fortified asphalt core formed between two saturated fibreglass felts. Torch-safe. Thickness 3.2 mm. Standard of acceptance: Soprema Sopraboard.

2.7 ROOF MEMBRANE MATERIALS

.1 Base Sheet: Thermofusible elastomeric bitumen (SBS modified bitumen) reinforced with a non-woven polyester reinforcement, top face covered with a thermofusible plastic film, under face lightly sanded; conforming to CGSB 37-GP-56M, Type 2, Class C, Grade 2. Thickness 2.2 mm (2.0 mm min.). Standard of acceptance: Soprema Elastophene 180 PS.
- .1 Apply membrane by bonding with hot asphalt.
- .2 Components:
  - .1 Reinforcement: Non-woven polyester 180 g/m^2.
  - .2 Modified bitumen: Mix of selected bitumen and SBS thermoplastic polymer.

.2 Base Sheet Stripping (flashing): Thermofusible elastomeric bitumen (SBS modified bitumen) reinforced with a glass fibre reinforcement, top face covered with a thermofusible plastic film, underside covered with a silicone release plastic film protecting the self-adhesive underface; conforming to CGSB 37-GP-56M, Type 2, Class P, Grade 1. Thickness 2.6 mm. Standard of

acceptance: Soprema Sopraflash Flam Stick.

.1 Apply membrane by self-adhesion on primed substrate. Use self-adhesive membrane base sheet in all locations where the substrate consists of wood or wood products (i.e. wood blocking).

.2 Components:

.1 Reinforcement: Non-woven polyester 130 g/m^2.

.2 Modified bitumen: Mix of selected bitumen and SBS thermoplastic polymer.

.3 Primer: As recommended by the system manufacturer.

.3 Cap Sheet and cap sheet stripping (flashing): Thermofusible elastomeric bitumen (SBS modified bitumen) reinforced with a non-woven polyester reinforcement, topside self-protected with highly reflective mineral granules, underside protected by thermo-fusible plastic film, conforming to CGSB 37-GP-56M, Class C, Type 2, Grade 2. Approximate nominal average thickness 4.0 mm. Standard of acceptance: Soprema Sopralene Flam 250 GR.

.1 Components:

.2 Apply membrane by torching only.

.3 Components:

.1 Reinforcement: Non-woven polyester 250 g/m^2.

.2 Modified bitumen: Mix of selected bitumen and SBS thermoplastic polymer.

2.8 ACCESSORIES

.1 Cant Strip (when required by roofing manufacturer): Fire-resistant wood fibre.

.2 Roofing nails: In compliance with CSA B111, Table 12, nails shall be made of galvanized steel, long enough to penetrate wood substrate by at least 20 mm. Mechanical fasteners:

.1 Round top cap nails, 25 or 38 mm or equivalent stainless steel or galvanized fastenings as recommended by material manufacturers or as required for the purpose.

.2 In compliance with CSA B111, Table 12, nails shall be long enough to penetrate the substrate by at least 20 mm on flashings and parapet walls.

.3 Use FM approved screws to fasten insulation. Screws to penetrate deck, minimum 20 mm (maximum 20 mm where deck is exposed in building interior). Frequency and pattern all to meet FM I-90 windstorm requirements, including additional quantities at corners and at perimeter.

.3 Roof drain sumps: 1200 mm x 1200 mm sump kits. Provide at all roof drains.

.4 Expansion Joint: Curb-mounted expansion joint cover consisting of four 0.46 mm (26 ga) metal nailing strips heat-fused to twin 1 mm thick layers of flexible reinforced flashing membrane made from PVC/rubber alloy reinforced with polyester scrim, complete with a fire-retardant neoprene foam strip bonded in the centre to help insulate the expansion joint. Design for 65 mm wide expansion joints as indicated.

.1 Horizontal surface to horizontal surface.

.2 Horizontal surface to vertical surface.

.5 Liquid Membrane Flashing: one-component polyurethane and bitumen liquid membrane, and a flexible 100 g/m^2 woven polyester reinforcing membrane, as recommended by roofing membrane manufacturer.

.6 Loose granules, composition and colour to match granule surface of roofing membranes. Granules to be embedded into heated asphalt surfaces at joints between rolls or at any other locations where the visual continuity of the granule surface is interrupted.

.7 Metal flashings, vents and pipe sleeves: Refer to Section 07 62 00 "Metal Flashing and Trim".

.8 Roof drains: Refer to Division 22 "Plumbing".

Part 3 Execution

3.1 INSTALLATION

.1 Do not install materials under conditions of rain, snow or fog.

.2 Install roofing elements on clean and dry surfaces, in accordance with the manufacturer's requirements and recommendations.

.3 Perform work on a continuous basis as surface and weather conditions allow.

.4 Protect adjoining surfaces against any damage that could result from the roofing installation.

3.2 EQUIPMENT

.1 Maintain all equipment and tools in good working order.

.2 Use torch types recommended by the membrane manufacturer.

3.3 DECK SHEATHING INSTALLATION

.1 Install gypsum board sheathing to the steel deck, as indicated on the drawings and in accordance with the manufacturer's recommendations.

.2 Install sheathing boards over steel deck with long side perpendicular to deck flutes.

.3 Provide continuous support at ends of boards. Use galvanized sheet steel strip, spanning the deck flutes.

.4 Lay boards in parallel courses, butted together in moderate contact, without gaps and with staggered end joints.

.5 Cut and trim boards to provide plain butt joints at perimeter, parapets, curbs, etc.

.6 Fastening: Follow sheathing manufacturer's recommendations for Factory Mutual approved fastener / adhesive spacing. Minimum requirement to be FM 1-90.

.7 Coordinate the installation of the sheathing with the installation of roof drains and other mechanical penetrations by Divisions 22, 23 and 26.

3.4 ASPHALT PRIMER APPLICATION

.1 Treat all surfaces to be roofed, with primer to improve adhesion. Apply by brush or roller at the manufacturer's recommended rate.

.2 Note that the drying time of the primer is related to the ambient temperature and may vary from a few hours to a whole day. Do not proceed until the primer is dry.

3.5 VAPOUR RETARDER INSTALLATION

.1 Coordinate with Section 06 10 00 "Rough Carpentry" and hand over starter strips of self-adhesive vapour retarder membrane for installation by Division 06 10 00 at the appropriate stage of the carpentry work for the roof assembly, in order to maintain complete continuity between the air/vapour barrier in the wall assembly and the vapour retarder in the roofing assembly.

.2 Install the self-adhesive vapour retarder, in accordance with the manufacturer's instructions.

.3 Install parallel to the long side of the roof.

.4 Roll the entire surface to make sure the membrane is properly adhered, without air pockets, wrinkles, fishmouths or tears.

.5 After installation of the membrane, check all lap seams by running a trowel along the seam.

.6 Maintain continuity with the building air/vapour barrier system as indicated on the drawings.

.7 Ensure the base sheet is unrolled to enable the membrane to relax prior to installation. The time required for relaxation will vary according to weather conditions.

.8 Lap joints:
- .1 Torch-weld all lap joints by heat softening the membrane and pressing the edge of the membrane firmly with a roofing trowel.
- .2 Roll the lap joints to ensure full adhesion.

3.6 INSULATION INSTALLATION

.1 Install insulation boards in two layers of the thicknesses indicated on the drawings.

.2 Stagger all joints in the boards and set into a full mop coating of asphalt.

.3 Install sloped insulation where required to maintain slope of roof to roof surface drains. In particular, provide water diverters on the upslope sides of HVAC equipment curbs to direct run-off from accumulating behind the units. Set sloped insulation in a full mop coating of bitumen.

.4 Install a roof drain sump at each roof drain. Ensure that the sump is installed at the proper elevation to function correctly.

.5 Install protection board over the entire surface of the insulation. Set in a full mop coating of bitumen.

3.7 BASE MEMBRANE APPLICATION

.1 Commencing at the lowest point of the roof, embed the base sheet in a full mop coat of approximately 1.2 kg/m^2 of asphalt. Apply base sheet with 75 mm side laps and 150 mm end laps. Extend the base sheet up vertical surfaces, as indicated on the drawings, in a full mop of asphalt.

.2 Ensure the base sheet is unrolled to enable the membrane to relax prior to installation. The time required for relaxation will vary according to weather conditions.

.3 Torch-weld all lap joints by heat softening the membrane and pressing the edge of the membrane firmly with a roofing trowel.

.4 Apply asphalt not more than 1.5 m ahead of the membrane as it is being applied, while ensuring complete bonding.

.5 Ensure the base sheet membrane is installed parallel to the long side of the underlying insulation cap sheet.

.6 After installation of the membrane, check all lap seams on the cap sheet by running a trowel along the seam.

3.8 BASE SHEET STRIPPING (FLASHING) MEMBRANE APPLICATION

.1 Install the base sheet stripping, in accordance with the manufacturer's instructions.

.2 Ensure that primer coating is dry before application of the base sheet stripping.

.3 Lay base sheet stripping in strips 1 metre wide to the vertical surfaces, extending on to the flat surface of the roof a minimum of 100 mm. Side laps shall be 75 mm and shall be staggered a minimum of 100 mm with the laps of the base sheet.

.4 Install the self-adhesive base sheet stripping, in accordance with the manufacturer's instructions.

.5 Roll the entire surface to make sure the membrane is properly adhered, without air pockets, wrinkles, fishmouths or tears.

.6 After installation of the membrane, check all lap seams by running a trowel along the seam.

.7 Nail the base sheet top edge to the substrate at 300 mm o.c. in accordance with the manufacturer's recommendations.

3.9 CAP SHEET INSTALLATION

.1 Ensure that base membrane and reinforcement membrane are in place and without defects.

.2 Unroll the cap sheet membrane, starting from a low point of the roof. Reroll from both ends prior to torching. Take care to ensure good alignment of the first roll, parallel with the edge of the roof. Stagger joints at least 300 mm relative to reinforcement membrane and to base sheet membrane.

.3 Take particular care to maintain a consistent direction and alignment of joints between adjacent sheets as directed by the Consultant.

.4 Torch-weld membrane to the base sheet in accordance with the membrane manufacturer's recommendations. During this application, melt the undersurfaces forming an asphalt bead that is pushed out in front of the base sheet as the work proceeds. recommendations.

.5 Take care not to burn the membrane and its respective reinforcements.

.6 Lap sides 75 mm and ends 150 mm. Stagger end laps so as to avoid 4 overlaps. Stagger laps at least 300 mm relative to laps in base membrane and in reinforcement membrane.

.7 Avoid asphalt seepage at the seams greater than 5 mm.

.8 Heat the surface granules on laps and imbed into the liquid bitumen prior to installation of following sheets.

.9 Make sure the membrane is properly welded, without air pockets, wrinkles, fishmouths or tears.

.10 After installation of the membrane, check all lap seams on the cap sheet by running a trowel along the seam.

3.10 CAP SHEET STRIPPING (FLASHING) INSTALLATION

.1 Torch weld cap flashing membrane in place.

.2 Lay membrane in strips one metre wide. Side laps to be 75 mm, staggered at least 300 mm relative to the cap sheet.

.3 At parapets and curbs, membrane to extend 150 mm out onto the roof, up the back face of the parapet, over the top of the parapet and terminate 50 mm down the outer face of the parapet unless indicated otherwise.

.4 At other vertical surfaces membrane to extend 150 mm out onto the roof, over the cant strip, up the back face of the parapet to the elevation indicated or where required for a complete, watertight installation.

.5 Torch-weld reinforcement stripping directly onto its support from bottom to top. Torch-welding shall soften the underside of the reinforcement stripping without overheating, resulting in a uniform adhesion over the entire surface.

.6 Take care not to burn the membrane and its respective reinforcements.

.7 Make sure the membrane is properly welded, without air pockets, wrinkles, fishmouths or tears.

.8 During installation, avoid asphalt seepage greater than 5 mm at seams.

.9 Nail the top edge as per manufacturer's recommendations.

.10 After installation of the membrane, check all lap seams by running a trowel along the seam.

3.11 ROOF DRAINS

.1 Coordinate with Division 22 to ensure proper seals to roof drains.

3.12 METAL FLASHINGS AND SCUPPERS

.1 Install metal flashings and scuppers as indicated on the drawings, in accordance with CRCA Specifications and as specified in Section 076200 "Sheet Metal Flashing and Trim".

3.13 VENT AND PIPE SLEEVE INSTALLATION

.1 Coordinate with Section 07 62 00 "Sheet Metal Flashing and Trim" and install vents stack flashings and pipe sleeves specified in Section 07 62 00.

.2 Install spun-aluminium vent stack covers at all vent pipes. Extend vent pipes as required to a minimum height of 400 mm above the completed membrane surface. Extension to be same material as existing vent pipe. Provide sufficient allowance for pipe expansion or contraction.

.3 Prime aluminium flange, centre over existing vent stack and set into torch-softened base sheet. Flash with one ply of reinforcing membrane, to extend a minimum of 200 mm beyond flange. Complete installation with the application of the cap sheet membrane.

.4 Install batt insulation as specified in Section 07 21 10 between vent stack and aluminium stack flashing.

.5 Caulk as detailed. Install a bead of modified bitumen caulking around the base of the vent stack flashing. Embed bulk granules into new sealant, colour to match cap sheet.

.6 Secure caps with self-tapping screws.

.7 Install all items required for a complete project. Refer to mechanical drawings for location and extent of mechanical penetrations through the roof.

3.14 LOOSE GRANULE APPLICATION

.1 At all laps exposed to sight and at all other locations where the visual continuity of the finished membrane is interrupted, soften the exposed asphalt and embed loose granules to match granule surface of the membrane.

.2 The finished roof surface exposed to sight shall appear homogeneous and of consistent colour and texture, without blemish.

3.15 FIELD QUALITY CONTROL

.1 The Owner will engage an independent inspection and testing firm (Roofing Inspector) to conduct site inspections and tests to verify compliance with the Contract Documents. Tests shall include flood tests.

.2 Cooperate with the Roofing Inspector. Provide at least 48 hours notice of commencement of each phase of the work. Provide the Inspector with unlimited access to the Work.

.3 The Owner reserves the right to require additional inspections and tests, to be paid for by the Contractor, if the initial inspections/tests indicate unsatisfactory workmanship.

3.16 CLEANING

.1 Upon completion of the work of this Section 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 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 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 sheet metal flashing and trim, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 04 20 00 - Unit Masonry.
- .2 Section 06 10 00 - Rough Carpentry.
- .3 Section 07 31 13 - Asphalt Shingles.
- .4 Section 07 52 16 - SBS Modified Bituminous Roofing.
- .5 Section 07 92 00 - Joint Sealants.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian Standards Association (CSA):
- .1 CSA-A123.3-05(2012), Asphalt Saturated Organic Roofing Felt.
- .2 CSA-B111-1974 Wire Nails, Spikes and Staples.

.3 Canadian Roofing Contractors' Association (CRCA):
- .1 Perform sheet metal work associated with roofing in accordance with applicable CRCA standards and the roofing membrane manufacturer's printed instructions.

.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 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MATERIALS

.1 Galvanized sheet steel to ASTM A653M, Grade 230, Z275 coating, prepainted 10,000 Series Kynar. 0.76 mm (22 ga) minimum base metal thickness. Colours to be selected by the Consultant from the manufacturer's complete colour range.

.2 Underlayment: No.15 non-perforated asphalt felt to CSA-A123.3, single ply.

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

.4 Tape: isobutyl, colour grey, 3 x 25 mm.

.5 Cleats: of same material, and temper, as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

.6 Fasteners: Stainless steel, to CSA B111, type as recommended by installer for each specific application.

.7 Washers: Stainless steel, 1 mm thick with rubber packings.

.8 Back-priming sheet metal: High-build bituminous paint, SSPC-Paint 12.

2.2 FABRICATION

.1 Fabricate metal flashings and other sheet metal work as indicated and as required for a complete installation.

.2 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12 mm. Mitre and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.3 METAL FLASHINGS

.1 Form flashings, copings and parapet fascias to profiles indicated of prefinished metal sheet.

.2 Include flashings for roof dividers in general conformity with CRCA detail FL.14 and for curbs in general conformity with CRCA Detail FL.23.

2.4 PIPE PENETRATIONS

.1 Provide and install 1.6 mm (16 ga) spun aluminum flashings and caps to all vent stacks.

.2 For flashing of miscellaneous mechanical and electrical items penetrating the roof membrane, provide:

.1 Factory prefabricated, insulated aluminum sleeve flashings, with matching aluminum collar,

size to suit item to be flashed.

.2 Sleeve and collar to be fabricated from aluminum, with premoulded urethane insulation on the inner side, interior surfaces bituminous painted to prevent galvanic action with dissimilar metals. Aluminum for sleeve to be 1.6 mm (16 ga) thick and for collar to be 1.4 mm (17 ga) thick.

.3 Provide deck flange, integral with sleeve aluminum.

.4 Standard of acceptance: Roof accessories by Thaler Metal Industries Inc., (800) 287-7217 or type to suit each specific application.

.3 Pitch pockets are unacceptable.

Part 3 Execution

3.1 INSTALLATION

.1 Install sheet metal work to CRCA specifications except where otherwise detailed.

.2 Use concealed fastenings throughout.

.3 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips, except where otherwise shown.

.4 Lock end joints and caulk with sealant.

.5 Joints, seams and edges shall be formed, folded, locked and well caulked. Raw edges shall be turned under to conceal them.

.6 Provision shall be made for expansion and contraction and all work shall be executed using concealed fasteners.

.7 Caulk flashing at cap flashing with sealant. Install a continuous strip of isobutyl tape between parapet and flashing membrane to stop windblown water.

.8 At intersections with wall surfaces provide and adequately fasten metal counter flashings over roofing membrane flashings. No counter flashing shall be installed until built-up base flashings have been inspected.

3.2 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 or plastic cement from adjacent surfaces and make good any damage 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 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 a complete manufactured gutter and downpipe system, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 06 20 00 - Rough Carpentry.
- .2 Section 07 31 13 - Asphalt Shingles
- .3 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .4 Section 07 92 00 - Joint Sealants.

1.3 REFERENCES

.1 American Architectural Manufacturers Association (AAMA):
- .1 AAMA 2605-13, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

.2 American Society for Testing and Materials (ASTM):
- .1 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .2 ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.

.3 Canadian Standards Association (CSA):
- .1 CSA-W59.2-M1991(R2008), Welded Aluminum Construction.

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.
- .2 Include manufacturer's detailed technical product data, installation instructions and recommendations, dimensions of individual components, profiles, and finishes
- .3 Include manufacturer's technical data for specified finish.

.3 Samples: Submit a minimum 300 mm long sample complete with all accessories and fastening system components, fabricated from actual materials with colour and finish proposed for use.

.4 Shop Drawings:
- .1 Show fabrication and installation of gutter and downpipe system including fully dimensioned details of components and accessories.
- .2 Include installation details showing interface with adjacent construction,

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Store products in strict accordance with the manufacturer's recommendations, in a clean dry location.

.3 Do not expose products furnished with strippable protective masking to direct sunlight for more than 30 minutes without removing masking.

.4 Do not install finished materials with scars or abrasions.

1.6 PROJECT CONDITIONS

.1 Coordinate work of this Section with adjoining work for proper sequencing to ensure protection from inclement weather and to protect materials and their finish against damage.

.2 Do not install gutter/downspout system during inclement weather. When installing in cold temperatures, warm adhesives, caulks, and primers to at least 10^{o}C prior to application.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

1.8 WARRANTY

.1 In addition to the 12-months warranty prescribed in the General Conditions of the Contract, provide a manufacturer's 40-year warranty against clogging.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on T-Rex Gutters and Downpipe system manufactured by Alu-Rex 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 and related accessories from a single manufacturer.

2.2 GUTTER SYSTEM

.1 Proprietary aluminum closed gutter system with the following components:
- .1 Formed sheet aluminum gutter
- .2 Perforated sheet aluminum leaf guard providing continuous interlocking support at outer edge of gutter and continuous snap-on connection to gutter with screw attachment to structure at inner edge
- .3 Galvanized mounting screws c/w rubber gaskets.

.2 Performance characteristics:
- .1 Load supported: 373 kg per lineal metre.
- .2 Water volume capacity: 755 ml per hr.

.3 Standard of acceptance: T-Rex XL Model M-5800.

2.3 ACCESSORIES

.1 Corners: Mitred corners, factory-welded to CSA-W59.2.

.2 End caps: Provide fabricated end caps at all gutter ends and wall abutments.

.3 Gutter expansion joint: Manufacturer's elastomeric expansion joints with exterior cover plates at 12 m intervals.

.4 Sealant: high grade exterior sealant as recommended by gutter manufacturer.

2.4 DRAINWARE

.1 Downspout and elbows: Downspouts in sizes and locations as indicated on the drawings. Downspouts shall be manufactured from 1.02 mm aluminum, finished where exposed to sight to match finished gutter. Downspout elbow joints shall be heliarc welded to CSA-W59.2.

.2 Outlets: Aluminum outlets to connect gutter to downspout at all downspout locations.

.3 Wall Brackets: Brackets shall be manufactured from 3.2 mm x 25 mm extruded aluminum bar to ASTM B221, finished to match downspout.

2.5 FINISHES

.1 General: Apply coatings to exposed aluminum components after fabrication for maximum coating performance and to prevent crazing, abrasion, and damage to finished surfaces.

.2 Pretreatment: Aluminum components shall be pretreated with solutions to remove organic and inorganic surface soiling, remove residual oxides, followed by a chrome phosphate conversion coating to which organic coatings will firmly adhere.

.3 Coating Type: High Performance Coating, two-coat, shop-applied, 70% Polyvinylidene Fluoride (PVDF) coating based on Kynar 500 by Elf Atochem Inc. or Hylar 5000 resin by Ausimont U.S.A.Inc., conforming to AAMA 2605.

.4 Colour to be selected by the Consultant.

Part 3 Execution

3.1 EXAMINATION

.1 Examine substrates and conditions under which the gutters and downpipes will be installed and notify the Construction Manager in writing of conditions detrimental to the proper and timely completion of the work..

.2 Verify that wood plates and/or fascia boards are installed true, straight, and free of splits, cracks, or other irregularities.

.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 INSTALLATION

.1 Install the gutter and downpipe system in strict accordance with manufacturer's printed instructions. Deviations from the instructions are not permitted.

.2 Install gutter and leaf guard with a minimum slope 1:1000 and screw-fasten to substrates through perforations provided.

.3 Rivet and seal gutter joints with high grade exterior sealant as recommended by gutter manufacturer.

.4 Expansion Joints: Install elastomeric expansion joints if required by the length of the gutter and/or indicated on the reviewed and accepted shop drawings. Maximum expansion joint spacing shall be 12 m o.c.

.5 Install downspouts and elbows using wall brackets at maximum 1500 mm o.c., minimum 2 brackets per downspout.

.6 Rivet and seal joints to gutter and fittings with high grade exterior sealant as recommended by the system manufacturer.

3.3 TESTING

.1 In the presence of the Consultant, conduct tests to verify that the finished installation is leakproof.

.2 Correct deficiencies.

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.

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

.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, 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 firestopping and smoke seal materials, 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 04 20 00 - Unit Masonry.
- .3 Section 09 21 16 - Gypsum Board Assemblies.

.3 Fire stopping and smoke seals within mechanical assemblies (i.e inside ducts, dampers) and electrical assemblies (i.e. inside cable trays) are by the mechanical and electrical trades.

1.3 REFERENCES

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

.2 Underwriters' Laboratories Canada (ULC):
- .1 CAN4-S115-05, Standard Method of Fire Tests of Firestop Systems.

1.4 REGULATORY REQUIREMENTS

.1 The work of this Section shall conform to the requirements of the OBC 2006, latest revision, to ULC design requirements for each assembly and to 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 Product Data:
- .1 Provide product data.
- .2 Include installation instructions for each product.
- .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 Samples: Submit samples of each material or combination of materials proposed for use.

.4 Submit laboratory test reports certifying compliance of each proposed material or combination of materials with the specification requirements.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MATERIALS

.1 Fire stopping and smoke seal systems: in accordance with CAN4-S115, asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN4-S115 and not to exceed opening sizes for which they are intended.

.2 Service penetration assemblies: certified by ULC in accordance with CAN4-S115 and listed in ULC Guide No. 40 U19.

.3 Service penetration firestop components: certified by ULC in accordance with CAN4-S115 and listed in ULC Guide No. 40 U19.13 and ULC Guide No. 40 U19.15 under the Label Service of ULC.

.4 Fire-resistance rating of installed fire stopping assembly shall not be less than the fire-resistance rating of the surrounding floor and wall assembly.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.10 Sealants for vertical joints: non-sagging.

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 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.

.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 surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.2 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

.3 Mask where necessary to avoid spillage and over coating onto adjoining surfaces.

3.3 INSTALLATION

.1 Install fire stopping and smoke seals at service penetrations through fire resistive construction and at all locations where the continuity of fire resistive construction is interrupted, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

.3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.4 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.5 Tool or trowel exposed surfaces to a neat finish.

.6 Remove excess compound promptly as work progresses and upon completion.

3.4 REVIEW

.1 Notify the Consultant when ready for review and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

3.5 SCHEDULE

.1 Firestop and smoke seal at:
- .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
- .2 Top of fire-resistance rated masonry and gypsum board partitions.
- .3 Intersection of fire-resistance rated masonry and gypsum board partitions.
- .4 Control joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .5 Penetrations through fire-resistance rated floors, ceilings, and roofs.
- .6 Around mechanical and electrical assemblies penetrating fire separations.
- .7 Rigid ducts: greater than 129 cm^2: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
- .8 Between edge of floor slab and exterior wall assembly at building perimeter.
- .9 In other locations where the continuity of a fire-resistant element is interrupted.

3.6 CLEANING

.1 As work progresses, remove excess materials and clean adjacent surfaces immediately after application.

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

.3 Upon completion of the work of this Section:
- .1 Remove masking and temporary protection from adjacent surfaces.
- .2 Remove stains on adjacent surfaces and make good damage to adjacent surfaces caused by the work of this Section.
- .3 Remove from the premises all surplus material, dirt and debris caused by the work of this Section and leave the installation clean.

.4 Remove temporary dams after initial set of fire stopping and smoke.

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 sealant work, as indicated on the drawings, as specified herein and as required by job conditions and normally considered to be work covered by this Section.

.2 The term "sealant" shall be interpreted as synonymous with the term "caulking" where used on the drawings and/or in the specifications.

.3 Related Sections
- .1 Section 06 41 16 - Plastic-Laminate-Clad Casework.
- .2 Section 08 11 13 - Hollow Steel Doors and Frames.
- .3 Section 08 11 16 - Aluminum Doors, Frames and Interior Windows.
- .4 Section 08 35 16 - Accordion Folding Grilles.
- .5 Section 09 21 16 - Gypsum Board Assemblies.
- .6 Section 09 30 13 - Ceramic Tiling.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM C834-14, Standard Specification for Latex Sealants.
- .2 ASTM C920-14a, Standard Specification for Elastomeric Joint Sealants.

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

1.4 QUALIFICATIONS

.1 The work of this Section shall be executed by an independent Trade Contractor whose primary business is in the application of caulking and sealants, using tradesmen skilled and trained in the techniques of caulking, and who are completely familiar with the published recommendations of the manufacturer of the caulking material being used.

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

.3 Indication of lack of skill or defective work to be sufficient grounds for the Consultant to reject the installed caulking and to require its immediate removal and complete recaulking at no additional cost to the Owner during the warranty period.

.4 Cooperate with the Consultant and/or any inspection and testing agency the Construction Manager may appoint.

1.5 COMPATIBILITY

.1 Sealants used for the various building interior assemblies shall be selected from those specified in the respective assembly Section, and shall be coordinated with the sealant being provided under other Sections. Preferably, one sealant of the same manufacturer shall be used throughout. If different sealants are selected, from those specified, it is the responsibility of the respective Section to ensure compatibility between selected sealant, substrates, and sealants of other Sections which come in contact with the selected sealant.

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 Prior to commencement of the work, submit, for each type of sealant, a certificate signed by the sealant manufacturer which states:
- surface preparation requirements
- priming and application procedures
- verification that sealant materials are selected for use from those specified
- verification that sealants are suitable for their locality, purposes intended and joint designs
- verification that sealants are compatible with other materials and products with which they come in contact, including but not limited to sealants provided under other Sections, and finishes
- verification that sealants will not stain the substrates or finished products
- verification that sealant is suitable for temperature and humidity conditions at the time of application

.3 For each specified product, include manufacturer's material safety data sheets for the safe handling of the products, in accordance with WHMIS requirements.

1.7 ENVIRONMENTAL AND SAFETY REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada.

.2 Subject to compliance with other specification requirements, select low-odour, non-carcinogenic products in all locations for which such products are available.

.3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
.1 Do not apply sealants when the temperature of the sealant and the materials to which it is applied is below 5ºC.
.2 Should it become necessary to apply sealants when the temperature is below 5ºC, consult the sealant manufacturer and follow his recommendations.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact.

.2 Store materials in strict accordance with the manufacturer's recommendations. Protect from freezing, moisture, water and contact with ground or floor.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

1.10 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.

.2 In addition to the 5-year warranty specified above, provide a manufacturer's warranty for silicone sealants for a period of 20 years.

.3 Warrant that caulking work will not leak, crack, crumble, melt, shrink, bubble, run, lose adhesion or stain adjacent surfaces.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on the specific sealant products named herein.

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

2.2 SEALANTS

.1 Sealant Types:

Application	Type	Description	Movement Capability	Standards	Acceptable Product	Comments
Around interior door frames and windows, against drywall and where acoustical sealant exposed to sight is called for	A	Paintable, siliconized, acrylic latex sealant.		ASTM C834	Tremflex 834 Paintable Silconized Acrylic Latex Sealant	

Sealant for caulking countertops at wall, ceramic tile, plumbing fixtures, and in wet areas where not otherwise specified	B	One-part, acetoxy-cure, mildew-resistant, silicone sealant for non-porous substrates	± 25%		Dow Corning Tub, Tile & Ceramic Silicone Sealant	
Acoustical Sealant in concealed locations	C	Flexible Synthetic rubber acoustical sealant			Tremco Acoustical Sealant	

.2 Colour of sealants: selected from the manufacturer's complete colour range to match adjacent materials, to the approval of the Consultant.

.3 Joint cleaner: xylol, methylethyleketon, IPA, or non-corrosive type recommended by sealant manufacturer and compatible with joint forming materials.

2.3 ACCESSORIES

.1 Primers: type recommended by sealant manufacturer for each specific application.

.2 Joint fillers: Chemically compatible with primers and sealants, outsized 30 to 50%, type recommended by sealant manufacturer for each specific application.

.3 Bond breaker: pressure sensitive plastic tape, which will not bond to sealants.

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 For exterior sealants, arrange for a technical representative of the manufacturer to conduct adhesion tests for each joint condition and to make recommendations with respect to sealant type, primers (if required) and joint preparation. Do not deviate from the manufacturer's recommendations without prior written approval.

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

.4 Commencement of the work of this Section 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 Remove dust, paint, loose mortar and other foreign matter. Dry joint surfaces.

.2 Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sandblasting.

.3 Remove oil, grease and other coatings from non-ferrous metals with joint cleaner.

.4 Prepare concrete, masonry, glazed and vitreous surfaces to sealant manufacturer's instructions.

.5 Examine joint sizes and correct to achieve depth ratio 1/2 of joint width with minimum width and depth of 6 mm. Maximum width 75 mm.

.6 Install joint filler to achieve correct joint depth and shape with approximately 30% compression.

.7 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.8 Apply bond breaker tape where required to manufacturer's instructions.

.9 Use primers where recommended by the sealant manufacturer. Prime sides of joints to sealant manufacturer's instructions immediately prior to caulking.

3.3 WORKMANSHIP

.1 Caulk all joints between dissimilar materials.

.2 Before application of any sealant, confirm that sealant material is compatible with the materials and finishes of the surfaces to which the material is applied or is in contact with.

.3 Apply sealants in strict accordance with the manufacturer's printed directions for the specific applications of the particular materials used, using a gun with proper size nozzle. Use sufficient pressure to fill voids and joints solid. Superficial pointing with skin bead is not acceptable.

.4 Concrete or masonry joints shall be a minimum of 6 mm wide x 6 mm deep. Depth shall be equal to width in joints up to 12 mm wide. For joints 12 mm to 25 mm wide, depth shall be 12 mm.

.5 For joints in metal, glass and other non-porous surface, sealant depth shall be a minimum of 1/2 the applied sealant width, and shall in no case exceed the applied sealant width.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Neatly tool surface to a slight concave joint.

.7 Cure sealants in accordance with manufacturer's instructions. Do not cover up sealant until curing is complete and proper seal has been achieved.

3.4 SEALANT APPLICATION

.1 Apply caulking around the perimeter of every wall and partition, both sides of openings in interior partitions; interior side of openings in exterior walls.

.2 Apply sealant to all exposed control joints in masonry, concrete, and gypsum board walls, ceilings, and bulkheads, joints between adjacent building components.

.3 Provide interior caulking in walls, floor finishes around all metal frames, door frames, access panels, built-in specialties; around pipes, ducts, grilles, outlet boxes, conduits, etc. penetrating floors, walls and ceiling.

.4 Apply siliconized acrylic latex caulking around wood trim and wipe smooth prior to painting.

.5 Caulk solidly around inside of all window/wall and door/wall joints, horizontal and vertical window and door surrounds, and all other trim, to provide a weathertight seal and prevent condensation.

.6 Caulk the connection between the tops of the concrete block walls and the underside of the steel deck, wherever exposed to sight.

.7 Caulk around plumbing fixtures, base and rim of sinks with mildew resistant sealant.

.8 Supply and install paintable sealant around all piping to sinks and lavatories where piping passes through walls.

3.5 PREFORMED FOAM SEALANT INSTALLATION

.1 Install preformed foam sealant in joints where indicated, in accordance with the manufacturer's printed instructions.

.2 Verify dimensions on site and take particular care to select the correct size preformed sealant for the joint.

.3 Install sealant to a clean line, flush with adjacent surfaces, and filling the joint, without interruption, for its entire length.

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 of this Section and leave the installation clean.

.2 Clean any drippage or spills of sealant or primers from adjacent surfaces immediately and make good any damage caused by the work of this Section, using cleaners recommended by the manufacturer, as work progresses.

.3 Remove masking tape after tooling of joints.

3.7 MANUFACTURER'S WARRANTY INSPECTION

.1 Upon completion, arrange for inspection of exterior sealant work by a technical representative of the sealant manufacturer.

.2 Correct any deficiencies.

.3 Arrange for the issuance of the manufacturer's 20-year materials warranty for exterior sealants.

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 04 20 00 - Unit Masonry.
- .2 Section 06 10 00 - Rough Carpentry.
- .3 Section 07 21 19 - Urethane Foam Insulating Sealant.
- .4 Section 07 27 10 - Membrane Air/Moisture Barrier.
- .5 Section 07 92 00 - Joint Sealants.
- .6 Section 08 14 16 - Flush Wood Doors.
- .7 Section 08 71 10 - Door Hardware.
- .8 Section 08 80 00 - Glazing.
- .9 Section 09 21 16 - Gypsum Board Assemblies.
- .10 Section 09 91 00 - Painting.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian Standards Association (CSA):
- .1 CSA-W59-13, Welded Steel Construction (Metal Arc Welding).

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

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

.5 Master Painters Institute (MPI):
- .1 MPI Architectural Specification Manual, 2014 (referred to herein as "MPI Manual")
- .2 MPI Approved Product List, (referred to herein as "MPI APL").

.6 National Fire Protection Association (NFPA):
- .1 NFPA 80-2013, Standard for Fire Doors and Other Opening Protectives.
- .2 NFPA 252-2012, Standard Methods of Fire Tests of Door Assemblies.

.7 Underwriters' Laboratories of Canada (ULC):
.1 CAN/ULC-S104-10, Standard Method of Fire Tests of Door Assemblies.
.2 CAN/ULC-S105-09, 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 the requirements of the OBC 2012, latest revision, 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 Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 STEEL

.1 Steel: Commercial grade steel to ASTM A 653/A 653M, 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 specified in Section 08 71 10 "Door Hardware".

.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.
- .3 Fill voids between stiffeners with expanded polyurethane insulation.
- .4 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 #18, 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 wood slab doors, 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 71 10 - Door Hardware.
- .3 Section 09 91 00 - Painting.

1.3 References

.1 Architectural Woodwork Manufacturers' Association of Canada (AWMAC):
- .1 Architectural Woodwork Standards, 1st. Edition, 2009 (referred to hereinafter as "AWS").

.2 Canadian General Specification Board (CGSB):
- .1 CAN/CGSB-11.3-M87, Hardboard.

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

.4 National Fire Protection Association (NFPA):
- .1 NFPA 80-2007, Standard for Fire Doors and Other Opening Protectives.

.5 Underwriters' Laboratories of Canada (ULC):
- .1 CAN/ULC-S104-10, Standard Method of Fire Tests of Door Assemblies.
- .2 CAN/ULC-S105-09, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.4 PROTECTION

.1 Protect doors from dampness. Arrange for delivery after work causing abnormal humidity has been completed.

.2 Store doors in well ventilated room, off floor, in accordance with manufacturer's recommendations.

.3 Protect doors from scratches, handling marks and other damage. Wrap all doors.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

.1 Fire rated doors: 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 the requirements of the OBC 2006, latest revision, and all other applicable codes and regulations, to the satisfaction of the authorities having jurisdiction.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

1.7 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.

.2 Warrant that doors will not warp, twist, show core holes, delaminate or sag.

Part 2 Products

2.1 MATERIALS

.1 Doors in public spaces and suite entry doors: Flush solid core wood interior doors to AWS Section 9, door type PC-5, custom grade, as follows:
- .1 Fire rating: 20 minutes for suite entry doors and where indicated on the door schedule.
- .2 Thickness: 45 mm.
- .3 Construction: framed core of extruded particleboard to ANSI A208.1, Grade LD-1 or LD-2. Stiles and rails securely bonded to core then entire unit abrasive planed before veneering.
- .4 Top and bottom rails: Minimum 21 mm thick after factory fitting, one-piece or laminated wood without voids or telegraphing.
- .5 Stiles: Minimum 25 mm thick after factory fitting, solid or laminated wood.
- .6 Crossband: Nominal 1.6 mm thick one-piece wood, species at the option of the fabricator.
- .7 Face skins:
  - .1 Doors in public utility spaces: Paint grade hardwood veneer, species at the option of the fabricator.
  - .2 Suite doors: Maple veneer in accordance with AWS Section 4, based on veneer face grades established by HPVA: Grade AA, flat cut, random slip matched for stain or clear finish.
- .8 Edge detail: AWS Type A.
- .9 Adhesives:
  - .1 Face adhesive: Type I(waterproof).
  - .2 Core assembly adhesive: Type II (water-resistant).
- .10 Glazing stops (where applicable): Lip moulding profile.

.2 Doors within Suites: Hollow core:
- .1 Thickness: 35 mm.
- .2 Construction: honeycomb.
- .3 Face: Hardboard to CAN/CGSB-11.3, embossed with traditional stile, rail and panel pattern, prime coated for paint finish by Section 09 91 00 "Painting".
- .4 Adhesive: Type II (water-resistant).

2.2 FABRICATION

.1 Fabricate doors and panels in accordance with AWS Section 9.

.2 Bevel vertical edges of single acting doors 3 mm on lock side and 1.5 mm on hinge side.

Part 3 Execution

3.1 INSTALLATION

.1 Install doors and hardware in accordance with ANSI/DHI A115 IG and manufacturer's instructions.

.2 Install fire rated doors and hardware to NFPA 80.

.3 Fit hardware accurately and securely in accordance with the manufacturer's directions. Adjust operating parts for smooth, correct function. Refer to Section 08 71 10.

.4 Seal all four edges immediately for fitting, including areas routed for concealed closers and other hardware.

3.2 ADJUSTMENT

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

3.3 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 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 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 complete sliding closet door systems, as indicated on the drawings, as specified herein and as required for a complete project.
- .2 The base bid price shall be based on the specified materials. Alternative prices will be required for various up-grades.

1.3 SUBMITTALS

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

.2 Shop Drawings:
- .1 Indicate door, frame and hardware construction, dimensions and clearances, materials, thicknesses, gauges and finishes.
- .2 Include a schedule which identifies the location of each unit.

.3 Samples: Submit one 300 x 300 mm sample of a typical sliding door complete with frame and track.

.4 Product Data:
- .1 Provide product data for incorporation into the manual specified in Section 01 78 23 "Operation and Maintenance Manual".
- .2 Include installation instructions for the sliding door assembly.

1.4 PROTECTION

.1 Protect sliding door units from scratches, handling marks and other damage. Provide appropriate protective packaging.

.2 Clearly identify each sliding door type on the outside of the wrapping with a number or description corresponding to the location.

Part 2 Products

2.1 GENERAL

.1 This specification is based on Series 4050 framed panel sliding panel door assemblies as manufactured by Stanley Acmetrack 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 SLIDING PANEL DOOR ASSEMBLY

.1 Operation: Top rolled with anti-jump bottom guides.

.2 Fascia: Prefinished steel fascia, mounted on clips, two-piece design to compensate for an uneven header.

.3 Top track: Prefinished steel jump-proof J-track.

.4 Top hardware: Universal single-wheel roller, snap fitted into position, spring loaded for positive contact, with 38 mm vertical height adjustment.

.5 Stile: roll-formed steel.

.6 Bottom hardware: Nylon guide locks into track, making system jump-proof.

.7 Bottom track: Prefinished steel track not exceeding 16 mm high x 57 mm wide.

.8 Corrosion resistance: electro galvanizing.

.9 Panel: 6 mm prefinished hardboard, colour almond.

.10 Colour of steel finish: Almond.

Part 3 Execution

3.1 INSTALLATION

.1 Install sliding door assemblies in accordance with the manufacturer's printed instructions.

.2 Install square, level, plumb and true to line and fasten securely in position.

.3 Adjust hardware for correct function.

3.2 ADJUSTMENT

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

3.3 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 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 vinyl windows, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 06 10 00 - Rough Carpentry
- .2 Section 07 21 00 - Building Insulation
- .3 Section 07 27 26 - Fluid-Applied Air/Moisture Barrier
- .4 Section 07 44 56 - Mineral Fibre Cementitious Siding
- .5 Section 07 92 00 - Joint Sealants

1.3 REFERENCES

.1 American Architectural Manufacturers Association (AAMA):
- .1 AAMA 502-12, Voluntary Specification for Field Testing of Newly Installed Fenestration Products.
- .2 AAMA 901-10, Voluntary Specification for Rotary Operators in Window Applications.
- .3 AAMA 907-15, Voluntary specification for Corrosion Resistant Coatings on Carbon Steel Components Used in Windows, Doors and Skylights.

.2 American Society for Testing and Materials (ASTM):
- .1 ASTM D3656/D3656M-13, Standard Specification for Insect Screening and Louver Cloth woven from Vinyl-Coated Glass Yarns.
- .2 ASTM E405-04, Standard Test Methods for Wear Testing Rotary Operators for Windows.
- .3 ASTM E2112-07, Standard Practice for Installation of Exterior Windows, Doors and Skylights.

.3 Canadian Standards Association (CSA):
- .1 AAMA/WDMA/CSA/101/I.S.2/A440-08, Standard NAFS - North American Fenestration Standard/Specification for Windows, Doors and Skylights.

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: For each type of product, include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for vinyl windows.

.3 Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

.4 Samples:
.1 Submit colour samples for each exposed finish for the Consultant's selection.
.2 Submit full-size samples of each type of window hardware.

.5 Product Schedule: Submit a window schedule for the project using the same designations as indicated on the drawings.

.6 Qualification Data: Submit qualification data for manufacturer and installer as specified herein under "Quality Assurance".

.7 Product Test Reports: Provide product test reports for tests performed by a qualified testing agency verifying compliance with specification requirements.

1.5 QUALITY ASSURANCE

.1 Manufacturer Qualifications: A manufacturer capable of fabricating vinyl windows that meet or exceed specified performance requirements and of documenting this performance by test reports and calculations.

.2 Installer Qualifications: An installer acceptable to the vinyl window manufacturer for installation of units required for this project.

1.6 MOCK-UPS

.1 Construct a typical window installation for the approval of the Consultant.

.2 Locate where directed by the Consultant.

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

.4 The accepted mock-up shall be the standard of acceptance for the work of this Section.

.5 Acceptance of the mockup does not constitute approval of deviations from the Contract Documents contained in the mockup unless the Consultant specifically approves such deviations in writing.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

1.8 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 Manufacturer's Warranty: The Manufacturer agrees to repair or replace vinyl windows that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
- .1 Failure to meet performance requirements.
- .2 Structural failures including excessive deflection, water leakage, and air infiltration.
- .3 Faulty operation of movable sash and hardware.
- .4 Deterioration of materials and finishes beyond normal weathering.
- .5 Failure of insulating glass.

Part 2 Products

2.1 MANUFACTURERS

.1 Manufacturers: Subject to compliance with specification requirements, vinyl windows by the following manufacturers are acceptable:
- .1 Fleetwood Windows & Doors.
- .2 Jeld-Wen Inc.
- .3 Verdun Windows & Doors

.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 vinyl windows from a single source from a single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

.1 Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

.2 Performance Classification: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
- .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.

2.3 VINYL WINDOWS

.1 Types: Provide the following types in locations indicated on the drawings:
- .1 Fixed
- .2 Casement projecting out.

.2 Frames and Sashes: Impact-resistant, UV-stabilized PVC complying with AAMA/WDMA/CSA 101/I.S.2/A440.
- .1 Finish: Integral colour to be selected by the Consultant from the manufacturer's complete colour range.

.3 Glass: Refer to Section 08 80 00 "Glazing"

.4 Glazing System: Manufacturer's standard factory-glazing system that produces a weathertight seal.

.5 Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
- .1 Exposed hardware colour and finish: To be selected by the Consultant from the manufacturer's complete range.
- .2 Casement window hardware:
  - .1 Gear-type rotary operators to AAMA 901 when tested according to ASTM E405, Method A. Provide operators that function without requiring the removal of interior screens or using screen wickets.
  - .2 Type and Style: To be selected by the Consultant from the manufacturer's complete range of types and styles.
  - .3 Hinges: Manufacturer's standard type for sash weight and size. Stainless-steel hinges with stainless-steel-reinforced, sliding nylon shoes.
  - .4 Single-handle locking system: Operates positive-acting arms that pull sash into locked position. Provide one arm on sashes up to 735 mm tall and two arms on taller sashes.
  - .5 Limit devices (as required by OBC): Adjustable, limited, hold-open] device designed to restrict sash clear opening to 100 mm, with custodial key release.

.6 Weatherstripping: Provide full-perimeter weatherstripping for each operable sash.

.7 Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
- .1 Exposed fasteners: Use concealed fasteners to the greatest extent possible. Where exposed fasteners are unavoidable, for the application of hardware, use fasteners that match the finish the hardware being fastened.

2.4 ACCESSORIES

.1 Simulated muntin bars: Provide simulated muntin bar grilles in designs indicated for each sash lite.
- .1 Quantity and Type: One permanently located between insulating-glass lites and two permanently attached to the interior and exterior lites.
- .2 Material: Manufacturer's standard.
- .3 Pattern: To be indicated on the drawings.
- .4 Profile: To be selected by the Consultant from the manufacturer's complete range.
- .5 Colour: To be selected by the Consultant from the manufacturer's complete range.

2.5 INSECT SCREENS

.1 General: Fabricate insect screens to fully integrate with the window frames. Provide a screen for each operable exterior sash.
- .1 Type and Location: Full, inside for project-out casements.
- .2 Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitred or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
  - .1 Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.

.2 Finish for Interior Screens: Baked-on organic coating in colour to be selected by the Consultant from the manufacturer's complete range

.3 Glass-Fibre Mesh Fabric: 1.0 mm x 1.1-mm mesh of PVC-coated, glass-fibre threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D3656.
- .1 Mesh colour, manufacturer's standard.

2.6 FABRICATION

.1 Fabricate vinyl windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

.2 Glaze vinyl windows in the factory.

.3 Weather strip each operable sash to provide weathertight installation.

.4 Hardware: Mount hardware through double walls of vinyl extrusions or provide corrosion-resistant reinforcement.

.5 Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at the Project site.

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 openings and substrates have been properly prepared and adequate structural support and anchorage is in place.

.3 Verify rough opening dimensions, levelness of sill plate, and operational clearances.

.4 Examine wall flashings, air, vapour and moisture barriers, and other built-in components to ensure a weathertight window installation.

.5 Proceed with installation only after unsatisfactory conditions have been corrected.

.6 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 Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in the manufacturer's written instructions, comply with installation requirements in ASTM E2112.

.2 Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

3.3 FIELD QUALITY CONTROL

.1 The Construction Manager will engage a qualified testing agency to perform tests and inspections.

.2 Selected windows will be tested for air infiltration and water resistance in accordance with AAMA 502 for compliance with specified requirements.

.3 Remove and replace noncomplying windows and retest as specified above.

.4 The cost of initial inspection and testing will be paid by the Owner. The cost of re-testing/re-inspection necessitated by failure to meet specified requirements on the initial inspection/test shall be paid by the Contractor.

3.4 ADJUSTING, CLEANING, AND PROTECTION

.1 Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

.2 Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.

.3 Keep protective films and coverings in place until final cleaning.

.4 Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during the construction period.

.5 Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

.6 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.

.7 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 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 finish door hardware, 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 08 14 16 - Flush Wood Doors.
- .3 Section 08 17 26 - Aluminum Clad Wood Door/Frame Assemblies.
- .4 Section 08 71 13 - Cabinet and Miscellaneous Hardware.

1.3 REFERENCES

.1 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA):
- .1 Standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

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

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 Hardware Schedule:
- .1 Provide a complete Door Hardware Schedule for the Project.
- .2 Pay the cost of preparation of the Hardware Schedule and include in the Contract Price.
- .3 Clearly indicate hardware proposed, including make, model, material, function, finish and all other pertinent information.
- .4 The Construction Manager's and the Consultant's review of the Hardware Schedule does not limit or release the Trade Contractor from the responsibility to provide all necessary hardware and related components required for a complete installation as required by the authorities having jurisdiction.

.3 Samples: If requested by the Consultant, submit samples and technical literature as necessary to fully inform the Consultant regarding new hardware items proposed.

1.5 COORDINATION WITH OTHER TRADES

.1 Submit template information to all manufacturers and trades who have finish hardware applied to their products.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 HARDWARE ITEMS

.1 Products: Provide complete finishing hardware in accordance with the Hardware Schedule appended to this Section. Do not order any item until it has been approved by the Consultant.

.2 Keys, keying: Masterkey to the Owner's approval. Provide (3) cut keys per lock. Existing lock cylinders may be used provided they conform to the Owner's masterkeying requirements. Otherwise replace or supplement existing cylinders with new.

.3 Fasteners:
- .1 Provide manufacturer's recommended tamper-proof fasteners throughout.
- .2 Expansion shields shall be of double cinch anchor/type.
- .3 Fasteners shall be ferrous or non-ferrous to match the product being applied.
- .4 Length of fasteners shall be sufficient to afford adequate thread engagement.

.4 Specific hardware requirements are indicated on the drawings.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Furnish manufacturer's instructions for proper installation of each hardware component.

3.2 INSTALLATION: GENERAL

.1 Generally, the installation of door hardware is by the door installers. Refer to PART 1 GENERAL: Related Sections.

END OF SECTION

INSERT DOOR HARDWARE SCHEDULE

[by Hardware Consultant]

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 supply cabinet hardware and miscellaneous hardware, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 06 41 19 - Melamine Board Casework.
- .2 Section 08 71 10 - Door Hardware.

1.3 SUBMITTALS

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

.2 Hardware Schedule:
- .1 Provide a complete Cabinet and Miscellaneous Hardware Schedule for the project.
- .2 Pay the cost of preparation of the Hardware Schedule and include in the Contract Price.
- .3 Clearly indicate hardware proposed, including make, model, material, function, finish and all other pertinent information.
- .4 The Construction Manager's and the Consultant's review of the Hardware Schedule does not limit or release the Trade Contractor from the responsibility to provide all necessary hardware and related components required for a complete installation as required by the authorities having jurisdiction.

.3 Samples and Literature:
- .1 If requested by the Consultant, submit samples and technical literature as necessary to fully inform the Consultant regarding hardware items proposed.
- .2 Submit samples and literature.

.4 Product Data:
- .1 Include installation instructions for each item of hardware.

1.4 DEVIATION FROM THIS SPECIFICATION

.1 If any deviation from the items scheduled herein is proposed, submit a list of the alternative items. If requested, provide samples and technical literature.

.2 Acceptance will be subject to the written approval of the Consultant.

.3 Installed hardware which deviates from the specified items and has not been approved by the Consultant may be rejected and, if so rejected, shall be replaced with the scheduled hardware at no additional cost to the Owner

1.5 COORDINATION WITH OTHER TRADES

.1 Submit template information to all manufacturers and trades who have finish hardware applied to their products.

1.6 DELIVERY AND STORAGE

.1 Store hardware in locked, clean and dry area.

.2 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on products by the following manufacturers:
- .1 Julius Blum Canada Ltd.
- .2 Häfele Canada Inc.
- .3 Hettich Canada L.P.
- .4 Knape and Vogt Canada Inc.
- .5 Quincaillerie Richelieu Ltée.
- .6 Stanley Hardware.

.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.

.3 Use one manufacturer's product for all similar items.

2.2 HARDWARE ITEMS

.1 Door and Drawer Pulls: 128 mm clear anodized aluminum D-pull. Standard of acceptance:
- .1 No. 30135 by Quincaillerie Richelieu Ltee.

.2 Cabinet door hinges: All metal, concealed casework hinges with cruciform mounting plates to provide gap, depth and height adjustment. Full overlay and half overlay as required, minimum 170

deg. opening. Cup diameter 35 mm. Finish: Bright nickel C14. Provide one self-closing and one free-swinging hinge per door. Standard of acceptance:
.1 Blum Modul 170 Series, Nos. 90A6500, 91A6500, 90A6600, and 91A6600.
.2 Hettich Varimat 7795 Series, Nos. 007 997, 008 510, 022 828, and 022 753.
.3 Stanley 1510 Series, Nos. 1510-2, 1511-2, 1510-9X, and 1511-9X.

.3 Drawer Hardware: heavy duty, full extension, self-closing drawer slides, length to suit depth of drawer. Standard of acceptance:
.1 Blum BS 430E Series.
.2 Hettich FR 6142 Series.
.3 Knape and Vogt 1428 Series.

.4 Adjustable shelf hardware: Steel standards for fully recessed mounting on cabinet gables, c/w matching shelf supports. Zinc-plated finish: Provide four (4) supports per shelf plus 10% spare. Standard of acceptance:
.1 Knape & Vogt #255 ZC standards, c/w # 256 ZC shelf supports.
.2 Richelieu #120 Series standards, c/w # CP21-2G shelf supports.
.3 Stanley #79-1352.

.5 Door and drawer bumpers: Provide two plastic press-in bumpers at each door and drawer. Peel and stick bumpers are not acceptable. Standard of acceptance: Richelieu #MP590.420-11.

.6 Coat rails: Chrome or nickel plated oval tube, 30 mm high x 15 mm wide, cut to required length. Provide matching end supports and intermediate hangers where required. Standard of acceptance:
.1 Hettich #015 992, c/w #016 880 end supports.
.2 Richelieu #170-140 or 170-3-140, c/w #7837-180 end supports.
.3 Knape & Vogt #880 CHR 96 or 880 CHR 144, c/w #881 end supports.

2.3 FASTENINGS

.1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.2 Exposed fastening devices to match finish of hardware.

.3 Use fasteners compatible with material through which key pass.

Part 3 Execution

3.1 INSTALLATION INSTRUCTIONS

.1 Provide manufacturers' instructions for proper installation of each hardware component.

3.2 INSTALLATION

.1 Hand over hardware items for installation by Section 06 20 00 "Finish Carpentry" and Section 06 41 19 "Melamine Board Casework".

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 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 - Steel Doors and Frames.
- .2 Section 08 17 26 - Aluminum Clad Wood Door/Frame Assemblies.
- .3 Section 08 52 13 - Aluminum Clad Wood Windows.

1.3 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
- .2 CAN/CGSB-12.3-M91 Flat, Clear Float Glass.
- .3 CAN/CGSB-12.8-M97, Insulating Glass Units.
- .4 CAN/CGSB-12.11-M90, Wired Safety Glass.
- .5 CAN/CGSB-19.13-M87, Sealing Compound, One Component, Elastomeric, Chemical Curing.

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 Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

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.

.3 Warrant mirrors against failure of silvering.

Part 2 Products

2.1 GLASS

.1 Insulating glass units for exterior windows and doors: Refer to Section 08 17 26 "Aluminum Clad Wood Door/Frame Assembly" and Section 08 52 13 "Aluminum Clad Wood Windows".

.2 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, minimum 6 mm.

.3 Fire-rated interior glazing: Clear wired glass to CAN/CGSB-12.11, Type 1 transparent, Style 3 square mesh. Thickness as required by in-service loading conditions, minimum 6 mm.

.4 Tempered glass mirrors, electrolytically copper plated and guaranteed against silver spoilage and warranted for ten years, rounded corners, ground edges, predrilled holes top and bottom for screw-mounting, sizes as indicated.

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 EXTERIOR WINDOWS AND DOORS

.1 Installation by the system manufacturer. Refer to Sections 08 17 26 and 08 52 13.

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 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 install gypsum board wall and ceiling finishes, as indicated on the drawings, as specified herein and as required for a complete project.
- .2 The work includes gypsum board exterior wall sheathing.

.2 Related Work:
- .1 Section 04 20 00 - Unit Masonry.
- .2 Section 06 10 00 - Rough Carpentry.
- .3 Section 07 21 00 - Building Insulation.
- .4 Section 07 92 00 - Joint Sealants.
- .5 Section 09 30 13 - Ceramic Tiling.
- .6 Section 09 51 13 - Suspended Acoustical Panel Ceilings.
- .7 Section 09 91 00 - Painting.
- .8 Division 26 - Electrical.

1.3 REFERENCE STANDARDS

.1 American Society for Testing and Materials:
- .1 ASTM A641/A641M-09a(2014), Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- .2 ASTM A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM C11-13, Standard Terminology Related to Gypsum and Related Building Materials and Systems.
- .4 ASTM C475/C475M-12e1, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .5 ASTM C840-13, Standard Specification for Application and Finishing of Gypsum Board.
- .6 ASTM C1047-14a, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- .7 ASTM C1178/C1178M-13, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel.
- .8 ASTM C1396/C1396M-14a, Standard Specification for Gypsum Board.

.2 Underwriters' Laboratories Canada (ULC):
- .1 Design requirements for fire resistant assemblies.

1.4 REGULATORY REQUIREMENTS

.1 Fire-resistance rated assemblies incorporating gypsum board: ULC fire resistive floor/ceiling and roof/ceiling design requirements.

1.5 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.

1.6 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 4°C. For adhesive attachment and finishing of gypsum board, maintain not less than 10°C for 48 hours before application and continuously after until dry. Do not exceed 35°C 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.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 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.

.3 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.

2.2 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.

2.3 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.

2.4 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 Fasteners: Steel drywall screws for fastening gypsum board to wood framing or furring.

.5 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 Attach ceilings and soffit framing to wood framing members. Do not attach to plywood subfloor or sheathing.

.2 Install work level to tolerance of 1:1200.

.3 Frame perimeter of openings for access panels, light fixtures, diffusers, grilles and similar items which penetrate the ceiling surface. Coordinate with Section 06 10 00 "Rough Carpentry".

3.3 GYPSUM BOARD APPLICATION

.1 Do not apply gypsum board until bucks, anchors, blocking, electrical and mechanical work have been reviewed and accepted by the Consultant.

.2 Apply gypsum board to wood furring or framing using screw fasteners. Maximum spacing of screws 300 mm o.c.

.3 Conform to UL design requirements for fire resistance rated assemblies.

.4 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.

3.4 ACCESSORIES

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. 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.

3.5 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.

3.6 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.

3.7 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 attenuation insulation runs behind all penetrations. All electrical outlets to have vapour hoods and cover plate gaskets.

3.8 TAPING AND FILLING

.1 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.2 Finish corner beads, control joints, 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.

3.9 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 wood studs and/or furring spaced at maximum 400 mm o.c. and to bottom plates with 32 mm steel drywall 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 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 floor and wall tile, 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.
- .3 Section 09 21 13 - Gypsum Board Assemblies.
- .4 Division 22 - Plumbing.

1.3 REFERENCES

.1 American National Standards Institute (ANSI):
- .1 ANSI A118.3 (part of ANSI A108.1-1985, Installation of Ceramic Tile).

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-75.1-M88, Tile, Ceramic.
- .2 CGSB 71-GP-30-1979, Adhesive, Epoxy and Modified Mortar Systems, for Installation of Quarry Tiles.

.3 Terrazzo Tile and Marble Association of Canada (TTMAC):
- .1 TTMAC Specification Guide 09300, "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 the operation and maintenance 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 and base 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 Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

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 Floor tile: To be selected by the Consultant.

.2 Wall tile: To be selected by the Consultant.

.3 Neatly cut and grind edges of tiles as required, at bases and at edges at exposed perimeters of tiling.

.4 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 Build-up greater than 13 mm: Planicrate 50 additive with sand/cement mortar.

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, or Keracolor/Floor sanded, as applicable.

.2 Additive: Plastijoints acrylic grout additive.

.3 Colours as specified for each tile type.

Part 3 Execution

3.1 PREPARATION

.1 Apply tile or backing coats to clean and sound surfaces which are true to line, plumb, level or uniformly sloping to floor drains, as applicable.

.2 Use patching and/or levelling compounds, in accordance with manufacturer's instructions, to correct any defects in the substrate.

.3 Ensure that floor drains are in place before installation of floor tiles.

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 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 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 06 10 00 - Rough Carpentry.
- .2 Section 09 21 16 - Gypsum Board Assemblies.
- .3 Division 26 - Electrical.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM A641/A641M-09a(2014), Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- .2 ASTM A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM C423-09a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- .4 ASTM C635/C635M-13a, Standard Specification for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
- .5 ASTM C636/C636M-13, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- .6 ASTM E1264-08e1, 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 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^{o}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 Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MANUFACTURERS

.1 This Specification is based on suspension system and ceiling panels as manufactured by CGC Interiors.

.2 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 DX.

.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 To ASTM E1264, Type II, Form 2, Pattern CD, characteristics as follows:
- .1 Colour: White.
- .2 Size: 609 mm x 1219 mm x 16 mm.
- .3 Edge detail: Square lay-in.
- .4 Fire performance: Class A, flame spread 25 or under (UL labelled).
- .5 NRC: .55
- .6 CAC: 35
- .7 Light reflectance: 0.82.
- .8 Standard of Acceptance: CGC Fissured.

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 joimts 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.

.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 install resilient tile flooring, resilient base and related accessories, 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 06 10 00 - Rough Carpentry.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM F1066-04(2010)e1, Standard Specification for Vinyl Composition Floor Tile.
- .2 ASTM F1861-08, Standard Specification for Resilient Wall Base.

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:
- .1 Submit a minimum 150 mm x 150 mm sample of each type and colour of tile.
- .2 Submit a minimum 300 mm long sample of each type and colour of base.

.3 Maintenance Data: Provide maintenance data for resilient tile flooring for incorporation into the operation and maintenance manual specified in Section 01 78 00 "Closeout Submittals".

.4 Maintenance Materials
- .1 Provide minimum 5%, of each type and colour of tile used on the project for maintenance use.
- .2 Deliver to site in containers identified as to content and store where directed.
- .3 Maintenance materials to be from the same production run as installed materials.
- .4 Maintenance materials shall not be used for the correction of deficiencies or remedial work during the warranty period.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Maintain air temperature and structural base temperature at flooring installation area above 18°C for 48 hours before, during and for 48 hours after installation.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 VINYL COMPOSITION TILE

.1 Vinyl composition tile: to ASTM F1066, Type 2, 305 x 305 x 3.2 mm thick. Colours to be selected by the Consultant from the manufacturer's complete colour range.

2.2 RESILIENT BASE

.1 Resilient base: to ASTM F1861, Type TP - Rubber, continuous, top set, complete with premoulded end stops and external corners. Provide standard cove profile.
- .1 Thickness: 3.2 mm.
- .2 Height: 102 mm.
- .3 Lengths: cut lengths minimum 2400 mm.
- .4 Colours to be selected by the Consultant from the manufacturer's complete colour range.

2.3 ACCESSORIES

.1 Primers and adhesives: recommended by material manufacturer for specific material on applicable substrate.

.2 Sub-floor filler and leveller: as recommended by material manufacturer for use with the specific product.

.3 Trim: Edge strips for unprotected or exposed edges where flooring terminates. Purpose made extruded vinyl reducer strip, tapered profile, flush with tile surface. Colours and profiles to the approval of the Consultant. Standard of acceptance: Roppe vinyl accessories.

.4 Sealer and wax: types recommended by flooring manufacturer.

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 Ensure concrete floors are dry, by using test methods recommended by tile manufacturer.

.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 SUB-FLOOR TREATMENT

.1 Where tile is applied directly to the concrete floor slab, remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.2 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.

.3 Prime, seal, concrete to flooring manufacturer's printed instructions.

.4 Subfloors shall be dry, broom-clean and smooth, free from paint, varnish, wax and oil.

.5 If necessary to achieve a satisfactory surface, power sand concrete sub-floor.

3.3 VINYL COMPOSITION TILE INSTALLATION

.1 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place. Clean trowel regularly and file notches to maintain original size.

.2 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern as indicated on the drawings.

.3 Install flooring to square grid pattern with all joints aligned with pattern grain parallel for all units and parallel to length of room.

.4 Butt edges of tiles neatly to each other by lowering tile into adhesive. Do not slide tile into position.

.5 As installation progresses, and after installation, roll flooring with 45 kg minimum roller to ensure full adhesion.

.6 Press corners and edges of tiles into adhesive. Wipe off excess adhesive immediately with rag dampened with solvent recommended by tile manufacturer.

.7 Cut tile and fit neatly around fixed objects.

.8 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.

.9 Install edge strips reducers at unprotected or exposed edges where flooring terminates.

3.4 BASE APPLICATION

.1 Lay out base to keep number of joints at minimum.

.2 Set base in adhesive tightly by using 3 kg hand roller, against wall and floor surfaces.

.3 Install straight and level to variation of 1:1000.

.4 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

.5 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other than right angle.

.6 Include finished rubber bases to all cabinetwork in rooms where a rubber base is specified.

3.5 ACCESSORIES

.1 Install accessories in accordance with the manufacturers' printed instructions.

.2 Provide vinyl transition strips of suitable profile where tile terminates against other materials.

3.6 INITIAL CLEANING AND MAINTENANCE

.1 Remove excess adhesive from floor, base and wall and make good any damage caused by the work of this Section.

.2 After installation, wait two days before washing, to allow adhesive to set.

.3 Perform initial maintenance on the completed installation as recommended by the flooring manufacturer.

3.7 PROTECTION OF FINISHED WORK

.1 Prohibit traffic on floor for 48 hours after installation.

.2 Protect flooring as recommended by flooring manufacturer from damage by other trades and by the placement of fixtures and furnishings.

3.8 FINAL 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 adhesive from adjacent surfaces.

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 05 50 00 - Metal Fabrications
- .2 Section 08 11 13 - Steel Doors and Frames
- .3 Section 08 14 16 - Flush Wood Doors
- .4 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, 2014 (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.

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 The Consultant provide a colour schedule after award of Contract.

.2 Colour schedule will be based upon selection of three base colours and five accent colours.

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: G4

.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

Part 1 General

1.1 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 toilet and bath accessories, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 06 10 00 - Rough Carpentry: Wood and plywood blocking for wall-mounted items.
- .2 Section 08 80 00 - Glazing.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM A167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM B456-11e1, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

1.3 SUBMITTALS

.1 Shop Drawings:
- .1 Submit shop drawings or catalogue illustrations.
- .2 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, rough opening dimensions, and other pertinent information.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on toilet and bath accessories by ASI Watrous Inc.

.2 Except where otherwise stated, tradenames and catalogue references in this Section refer to Watrous products.

.3 Subject to compliance with the specification requirements, equivalent products by the following manufacturers are acceptable alternatives:
- .1 Bobrick Washroom Equipment of Canada Ltd.

.2 Frost Products Ltd.
.3 Wood & Wyant.

.4 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 Sheet steel: commercial quality to ASTM A653/A653M with ZF001 designation zinc coating.

.2 Stainless steel sheet metal: to ASTM A167, Type 304, with #4 finish.

.3 Stainless steel tubing: Type 304, commercial grade, seamless welded, 1.2 mm wall thickness.

.4 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.3 FINISHES

.1 Chrome and nickel plating: to ASTM B456, polished finish.

.2 Stainless steel: Polished finish.

.3 Manufacturer's or brand names on face of units not acceptable.

2.4 FIXTURES

.1 Grab bars: Concealed mounting, 38 mm dia. stainless steel. Configuration to OBC requirements. Standard of acceptance: 3200 Series.

.2 Toilet tissue dispenser: Surface-mounted dual roll type. Standard of acceptance: #9030

.3 Soap dispenser: Countertop-mounted, all-purpose soap dispenser. Standard of acceptance: #0332.

.4 Paper towel dispenser / waste receptacle: Semi-recessed for 203 mm or 229 mm wide x 244 m long rolls; 32.6 L stainless steel waste receptacle. Standard of acceptance: #64696-6.

.5 Towel bar: Heavy duty stainless steel, 457 mm long. Standard of acceptance: #0755-SS.

.6 Robe hook: Heavy duty, concealed mounting, chrome-plated brass: Standard of acceptance: #0751.

.7 Mirror: 457 mm x 609 mm, c/w 13 mm x 13 mm x 13 mm channel frame. Standard of acceptance: #0620.

.8 Janitor's shelf: Stainless steel utility shelf with drying rod, mop holders and rag hooks, 914 mm long. Standard of acceptance: #1315-4.

2.5 FABRICATION

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes to prevent electrolysis.

.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CAN/CSA-G164.

.7 Shop assemble components and package complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.9 Provide steel anchor plates and components for installation on studding and building framing.

Part 3 Execution

3.1 INSTALLATION

.1 Install and secure accessories rigidly in place as follows:
- .1 Install steel back-plate or plywood/wood blocking to stud space prior to drywall finish.
- .2 Provide back-plate with threaded studs or plugs.
- .3 For pluwood/wood blocking, provide suitable screw fasteners.

3.2 LOCATION AND QUANTITY

.1 Locate accessories where indicated and as follows. Exact locations determined by the Consultant.
- .1 Grab bars: one set to OBC reqiuirements at W.C. in barrier-free washroom.
- .2 Toilet tissue dispenser: one at each toilet.
- .3 Soap dispenser: one at each lavatory basin.
- .4 Paper towel dispenser / waste receptacle: one in each washroom.
- .5 Towel bar: one adjacent to shower.
- .6 Robe hooks: two adjacent to shower; two in barrier-free washroom.
- .7 Mirrors: one at each lavatory basin.
- .8 Janitor's shelf: One in janitor's closet.

END OF SECTION

INSERT ELEVATOR SPECIFICATION

[by Elevator Consultant]

INSERT DIVISIONS 21 TO 26

[by Mechanical and Electrical Engineers]

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 excavating, trenching and backfilling, 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 13 26 - Self-Adhering Sheet Waterproofing.
- .3 Section 07 21 00 - Building Insulation.
- .4 Section 31 46 20 - Foundation Drainage.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM C117-13, Standard Test Method for Materials Finer than 75 µm (No. 200 Seive) in Mineral Aggregates by Washing.
- .2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D422-63(2007)e2, Standard Test Method for Particle-Size Analysis of Soils.
- .4 ASTM D698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).
- .5 ASTM D1557-12, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).
- .6 ASTM D4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Ontario Provincial Standard Specifications (OPSS):
- .1 OPSS 1010-2013, Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.

1.4 REGULATORY REQUIREMENTS

.1 Perform all Work in accordance with provincial and municipal requirements, to the satisfaction of the authorities having jurisdiction.

1.5 INSPECTION AND TESTING

.1 The Construction Manager will direct an independent geotechnical testing agency to conduct field inspections and to perform required field and laboratory testing.

.2 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 Trade Contractor.

1.6 DEFINITIONS

.1 Common Excavation: Excavation of materials which can be ripped and excavated with heavy construction equipment.

.2 Rock Excavation: Excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having an individual volume in excess of 0.75 m^3.

.3 Waste Material: Excavated material unsuitable for re-use or surplus to requirements.

.4 Unsuitable Materials: Very weak and compressible materials; Frost susceptible materials. Suitability of materials will be determined by the geotechnical testing agency.

1.7 EXISTING UNDERGROUND UTILITIES

.1 Locate and protect during excavation work. If unknown or incorrectly charted utilities are encountered, stop work and inform the Construction Manager immediately.

1.8 SURVEY CONTROL POINTS

.1 Protect monuments, bench marks and other reference features.

Part 2 Products

2.1 MATERIALS

.1 General: Except where otherwise specified, all granular materials shall be virgin, free from recycled asphaltic concrete or Portland cement concrete materials.

.2 OPSS 1010, Granular "A".

.3 OPSS 1010, Granular "B", Type I.

.4 OPSS 1010, Granular "B", Type II.

.5 OPSS 1010, Granular "O".

.6 OPSS 1010, Select Subgrade Material (SSM).

.7 19 mm Clear crushed stone: clean, hard crushed stone, free from shale, clay, friable materials, organic matter and other deleterious substances when tested to ASTM C136 and ASTM C117 and conforming to the following gradation:

ASTM Sieve Designation	% Passing
19 mm	100
9.5 mm	0

.8 Sand (Granular "B", Type I, modified): clean, hard, durable sand, free from shale, clay, friable materials, organic matter and other deleterious substances when tested to ASTM C136 and ASTM C117.

ASTM Sieve Designation	% Passing
4.75 mm	100
1.18 mm	10 - 100
0.425 mm	5 - 30
0.075 mm	0 - 10

.9 Native and imported backfill: Selected material from the excavation or other sources, approved by the Consultant for the use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods refuse or other deleterious materials.

Part 3 Execution

3.1 PREPARATION

.1 Make pavement cuts with neat, clean-cut edges and legally dispose of removed material, off-site.

.2 Remove abandoned underground piping, conduits or other items which would interfere with construction.

3.2 DISPOSAL OF DEMOLISHED MATERIALS

.1 Following the Construction Manager's approval, legally dispose of, off-site, all debris, rubbish and other materials not suitable for re-use. Do not store on site.

3.3 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while work is in progress. Pump water from excavations continuously if necessary.

.2 Protect open excavations against flooding and damage due to surface run-off.

.3 Provide flocculation tanks, setting basins, or other treatment facilities to remove suspended solids or other material before discharging to storm sewers, water courses or drainage areas.

.4 Dispose of water in a manner not detrimental to public or private property, streets, sewers or any portion of work completed or under construction. Construct sedimentation traps where necessary.

.5 Protect the soils at footing locations from freezing. Provide frost protection as required.

.6 If requested, submit for the Consultant's review details of proposed dewatering or heave prevention methods.

3.4 EXCAVATION

.1 Dewatering: Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades and from flooding surrounding areas. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

.2 Excavation for Structures: Excavate to required elevations and dimensions within a tolerance of ± 25 mm. Extend the excavation sufficiently for placing and removing formwork, installing services and other construction and for inspections.

.3 Engineered fill: Remove unsuitable material such as existing fill or organic material down to undisturbed soil and replace with engineered fill as specified herein up to the level of the underside of the footings.

.4 Do not disturb excavation bottoms. Excavate by hand to final grade just before placing reinforcement and concrete. Trim to required lines and levels and leave a solid base for other work.

.5 Do not proceed with other work until excavation bottoms have been inspected and approved by the Consultant.

.6 Excavation for Utility Trenches:
- .1 Excavate trenches to required slopes, lines, depths and invert elevations.
- .2 Where trench excavations pass within 450 mm of building footings, backfill with concrete to level of bottom of adjacent footing.
- .3 Do not backfill until tests and inspections have been made. Take care not to damage or displace pipe systems during backfilling.

.7 Unauthorized Excavation: Fill unauthorized excavation under foundations by extending indicated bottom elevation of concrete foundation or footing to excavation bottom without altering top elevation. Lean concrete fill may be used with the Consultant's prior approval.

3.5 EARTH COVER

.1 Provide exterior footings and footings in unheated earth portions of the structure with at least 1500 mm of earth cover.

.2 Where feasible, provide footings to unheated areas, isolated footings and footings adjacent to areas which will be kept clear of snow with at least 1800 mm of earth cover.

.3 Where the specified earth cover cannot be achieved provide foundation insulation to the approval of the Consultant. Coordinate with Section 07 21 00 "Board Insulation".

3.6 BACKFILLING PLACEMENT AND COMPACTION

.1 Do not backfill until installations have been reviewed by the Consultant.

.2 Except where otherwise indicated, backfill with the following materials:
- .1 Backfill within building perimeter: OPSS Granular B Type II.
- .2 Backfill for exterior paved areas: OPSS Granular B Type II.
- .3 Backfill against the exterior of foundation walls: OPSS Granular B Type I or II.
- .4 Bulk backfill for exterior sodded or landscaped areas: Approved native soil or OPSS Granular B Type I or II.
- .5 Bedding for site services: OPSS Granular A.
- .6 Backfilling for site services: As specified above.
- .7 Granular fill under vehicular ramp to garage: OPSS Granular O.
- .8 Granular sub-base (where required) for paved areas: OPSS Granular B Type II.
- .9 Granular base under interior slab-on-grade: OPSS Granular A, blinded with a 40 mm layer of sand.
- .10 Granular base under exterior paved areas: OPSS Granular A.
- .11 Bedding for foundation and underslab drainage (where required): 19 mm clear crushed stone.

.3 Except where otherwise indicated, compact each layer of backfill to the following percentages of maximum dry density according to ASTM D1557:
- .1 Under structures, slabs-on-grade and pavements, 100%.
- .2 Under walkways: 95%
- .3 Under lawn, planted areas, or other unpaved areas: 90%

.4 Place and compact backfill materials in maximum 300 mm loose lifts for except under slabs-on-grade and paving and maximum 200 mm loose lifts under paving.

.5 Place and compact backfill materials equally on both sides of walls to minimize unequal earth pressure.

.6 Backfilling for site services:
- .1 Pipe bedding: Minimum 150 mm OPSS Granular "A" compacted to 95% standard proctor density. Extend the bedding material to the spring line of the pipe.
- .2 If the soil at the subgrade level becomes disturbed, increase bedding to 300 mm in thickness. Place and compact in two 150 mm lifts.
- .3 Cover material: From the spring line of the pipe to at least 300 mm above the top of the pipe, place OPSS Granular "A" or Granular B Type I and compact to at least 95% standard proctor density.
- .4 Trench backfill: Native material (grey-brown silty clay crust), to the Consultant's approval, may be used for trench backfill. Under paved areas, the soil used for backfill to a depth of 2 m shall match the soil at the trench walls for frost heave compatibility. Place backfill in maximum 150 mm lifts and compact to at least 90% standard proctor density.

- .5 If the moisture content of the native material makes it difficult to handle, use it in the lower portions of the trench only or waste the material.

.7 Engineered fill:
- .1 Install engineered fill where topsoil, organic material and/or fill exists in the zone of influence of the building.
- .2 Remove all existing fill, topsoil and organic material to a depth of at least 300 mm below subgrade level and proof roll the exposed grade with a heavy roller.
- .3 Sub-excavate any soft areas that become evident and replace with well-compacted fill.
- .4 Place Granular "B" Type II and compact to no less than 98% standard proctor density in lifts not exceeding 150 mm.

3.7 SURPLUS MATERIAL

.1 Remove from the site material unsuitable for fill, grading or landscaping and legally dispose of it.

END OF SECTION

INSERT OTHER DIVISION 31 SECTIONS

[by Civil Engineer]

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 precast concrete pavers, as indicated on the drawings, as specified herein and as required for a complete project.

.2 Related Sections:
- .1 Section 31 23 10 - Excavating, Trenching and Backfilling.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
- .1 ASTM C979-10 / C979M-10, Standard Specification for Pigments for Integrally Colored Concrete.

.2 Canadian Standards Association (CSA International):
- .1 CSA-A23.1\A23.2-09(R2014), Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CSA-A179-14, Mortar and Grout for Unit Masonry.
- .3 CSA-A231.1-14/A231.2-14, Precast Concrete Paving Slabs/Precast Concrete Pavers.
- .4 CSA-A283-06(R2011), Qualification Code for Concrete Testing Laboratories.

.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 Submit following sampling and testing data:
  - .1 Sieve analysis for gradation of bedding and joint material.
  - .2 Paving Slab sampling and testing.
  - .3 Evaluation of cleaning and sealing compounds.
- .2 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 Samples:
- .1 Submit two full-size samples of pavers.

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

1.5 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

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

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 Concrete Pavers

.1 Concrete paving slabs: to CSA-A231.1;
.1 Type, size, shape, colour and texture to be selected by the Consultant.
.2 Pigment: to ASTM C979.

2.2 GRANULAR SUB-BASE AND BASE MATERIALS

.1 Refer to Section 31 23 10 - Excavating, Trenching and Backfilling.

2.3 BEDDING AND JOINT MATERIAL

.1 Bedding and joint sand: clean, non-plastic, free from deleterious or foreign matter, natural or manufactured from crushed rock or gravel. Do not use limestone screenings or stone dust.

.2 Gradation: to CSA-A23.1, Grading Limits for Fine Aggregate, and CSA A179 as follows:
[see following page]

Sieve Designation	% Passing for Bedding Sand	% Passing for Joint Sand
10 mm	100	
5 mm	95-100	100
2.5 mm	80-100	95-100
1.25 mm	50-90	60-100
630 microns	25-65	
600 microns	35-80	
315 microns	10-35	
300 microns		15-20
160 microns	2-10	
150 microns		2-15

2.4 CLEANING COMPOUND

.1 Clear, organic solvent, designed and recommended by manufacturer for cleaning concrete pavers of contamination encountered.

.2 Acid based chemical detergent, designed and recommended by manufacturer for removal of contamination encountered on pavers.

2.5 SEALING COMPOUND

.1 Clear acrylic, exterior type, water based, specially formulated for application on precast concrete pavers.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, and data sheets.

3.2 STRUCTURAL SURFACE

.1 Verify that structural surfaces conform to levels and compaction required for installation of unit pavers. If discrepancies occur, notify the Construction Manager and do not commence work until instructed by the Construction Manager.

.2 Verify that top of structural surface top of base does not exceed a variation of plus or minus 10 mm of grade over a 3 m straightedge.

.3 Ensure that structural surface is not frozen and no standing water is present during installation.

.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 PLACING OF BEDDING MATERIAL

.1 Ensure bedding material is not saturated or frozen at any time during installation.

.2 Spread and screed bedding material on the structural surface to achieve 25 mm compacted thickness after vibrating pavers in place. Do not use joint sand for bedding sand.

.3 Do not disturb screeded material. Do not use bedding material to fill depressions in structural surface.

3.4 INSTALLATION OF CONCRETE PAVING SLABS

.1 Lay paving slabs to pattern indicated or as directed by the Consultant. Joints between pavers: 5 to 10 mm wide, or as recommended by manufacturer.

.2 Use appropriate end, edge and corner slabs. Sawcut paving slabs to fit around obstructions and at abutting structures.

.3 Use a low amplitude, high frequency, plate compactor capable of at least 22 kN centrifugal compaction force to vibrate paving slabs into bedding sand.

.4 Inspect, remove, and replace chipped, broken and damaged paving slabs.

.5 Sweep dry joint sand material into joints.

.6 Settle sand by vibrating paving slabs with plate compactor.

.7 Continue application of joint material and vibrating of paving slabs until joints are full. Do not vibrate within 1 m of unrestrained edges of paving slabs.

.8 Complete installation to within 1 m of laying face, with sand-filled joints, before any work-stoppage greater than 1 h.

.9 Sweep off excess joint material when installation is complete.

.10 Variations in final surface elevations not to exceed $\pm$10 mm under a 3 m long straightedge.

.11 Surface elevation of paving slabs: 3 to 4 mm above adjacent drainage inlets, concrete collars or channels.

.12 Ensure conformance of final elevations.

3.5 CLEANING

.1 Remove and dispose of loose, extraneous materials from surfaces to be cleaned.

.2 Apply cleaning compounds appropriate for removal of various contaminants encountered in accordance with manufacturer's recommendations.

.3 Final surface to be free of contamination.

3.6 SEALING

.1 Ensure paving slab surfaces to be sealed are clean, free of extraneous materials and efflorescence, dry and appropriately cured.

.2 Apply 2 coats of sealer in accordance with manufacturer's recommendations.

.3 Protect sealed surfaces from trespass until sealer has dried and hardened.

3.7 FINAL CLEAN-UP

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

.2 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 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 engineer, fabricate and install a precast modular concrete block retaining wall, as indicated on the drawings, as specified herein and as required for a complete project.
- .2 Work includes:
  - .1 Engineering design of the retaining wall assembly.
  - .2 Supply and installation of geogrid reinforcement
  - .3 Supply and installation of the wall blocks.
  - .4 Backfilling as specified in Section 31 23 10 to the lines and grades indicated.
- .3 The drawings are intended to show the general design intent. The Trade Contractor is responsible for the detailed engineering design of the retaining wall installation.

.2 Related Sections:
- .1 Section 31 23 10 - Excavating, Trenching and Backfilling

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM C1372-14a, Standard Specification for Dry-Cast Segmental Retaining Wall Units.
- .2 ASTM D422-63(2007)e2, Standard Test Method for Particle-Size Analysis of Soils.
- .3 ASTM D698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).
- .4 ASTM D1248-12, Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.

.2 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 Shop Drawings:
- .1 Clearly indicate the layout, dimensions, materials, details of construction, relationship to adjacent construction and other pertinent information.
- .2 Include a subgrade drainage system to divert water away from the retaining wall.
- .3 The retaining wall assembly, including all related connections and fastenings, shall be designed by a structural engineer licensed to practise in the Province of Ontario. Each shop drawing submitted shall bear the stamp and signature of the aforesaid structural engineer.

.3 Samples: Submit a sample concrete block fabricated from actual materials in the selected colour and texture.

.4 Product Data: Manufacturer's data sheets on each product to be used, including:
- .1 Preparation instructions and recommendations.
- .2 Storage and handling requirements and recommendations.
- .3 Installation methods.

.4 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.

.5 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.

1.5 PRE-INSTALLATION MEETING

.1 Convene a pre-installation meeting minimum two weeks prior to starting work of this section.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Prevent excessive mud, cementitious material, and like construction debris from coming in contact with the materials.

.

.2 Protect materials from damage once on site. Damaged materials including cracked and chipped block beyond allowances provided for in ASTM C1372 must not be used.

.3 Check the geogrid upon delivery to assure that the proper material has been received.

.4 Store geogrid shall be stored at a temperature above -23^{o}C.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

1.8 QUALIFICATIONS

.1 The work of this Section shall be fabricated by a manufacturer with minimum ten 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 installer.

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

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

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on Keystone retaining wall system by Permacon.

.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.

2.2 RETAINING WALL UNITS

.1 Keystone modular concrete wall units by Permacon, as follows:

.1 Minimum 28-day compressive strength (ASTM C1372): 20.7 MPa
.2 Average absorption rate (ASTM C1372): 120 kg/m^3
.3 Exterior dimensions uniform and consistent. Maximum dimensional deviations on the height of any two units shall be 3 mm.
.4 Wall units shall provide a minimum of 555 kg total weight per m^2 of wall face area.
.5 Exterior surfaces to be split-face.
.6 Colour, sizes and shapes to be selected by the Consultant

2.3 EARTHWORK MATERIALS

.1 Wall rock: Well-graded compactable aggregate, 6 mm to 38 mm size, with no more than 10% passing the #200 sieve. (ASTM D422).

.2 Backfill materials to be specified by the engineer responsible for the shop drawings. Refer to Section 31 23 10 "Excavating, Trenching and Backfilling".

2.4 DRAINAGE PIPE

.1 Perforated corrugated high density polyethylene tubing and fittings:
.1 Material: High density polyethylene resin to ASTM D1248 Type III, Category 4 or 5, Grade P33 or P34, Class C.
.2 Pipe diameter: 100 mm nominal, except where otherwise indicated.
.3 Joints: Snap, insert or split couplers, as recommended by pipe manufacturer.
.4 Sock: All drainage pipes to be encased in a continuous geotextile sock, filter.

Part 3 Execution

3.1 GENERAL

.1 Execute the work in strict accordance with the [manufacturer's instructions and the reviewed and accepted shop drawings, to the satisfaction of the authorities having jurisdiction.

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 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.

3.3 EXCAVATION

.1 Conform to Section 31 23 10 "Excavating, Trenching and Backfilling".

.2 Excavate to the lines and grades indicated on the drawings. Take care not to over-excavate beyond the lines shown, or to disturb the base elevations beyond those shown.

.3 Verify locations of existing structures and utilities prior to excavation. Ensure all surrounding structures are protected from the effects of wall excavation.

3.4 FOUNDATION SOIL PREPARATION

.1 Foundation soil shall be defined as any soils located beneath a wall.

.2 Excavate foundation soil to the lines and grades as shown on the reviewed and accepted shop drawings, or as directed by the on-site soils engineer.

.3 Foundation soil shall be examined by the on-site soils engineer to ensure that the actual foundation soil strength meets or exceeds assumed design strength. Soil not meeting the required strength shall be removed and replaced with acceptable material.

.4 Fill over-excavated areas with compacted backfill material approved by on-site soils engineer.

.5 Compact foundation soil to a minimum of 95% of Standard Proctor (ASTM D698) prior to placement of the base material.

3.5 BASE

.1 The base material shall be a low permeable granular material as specified by the engineer responsible for the shop drawings.

.2 Place base material shall be placed as shown on the reviewed and accepted shop drawing. Top of base shall be located to allow bottom wall units to be buried to proper depths in accordance with wall heights and specifications.

.3 Install base material on undisturbed native soils or suitable replacement fills compacted to a minimum of 95% Standard Proctor (ASTM D698).

.4 Compact base at 95% Standard Proctor (ASTM D698) to provide a level hard surface on which to place the first course of blocks. Construct the base to ensure proper wall embedment and the final elevation shown on the drawings. Well-graded sand can be used to smooth the top 13 mm on the base material.

.5 Base material shall be a 100 mm minimum depth for walls under 1.2 m and a 150 mm minimum depth for walls over 1.2 m.

3.6 UNIT INSTALLATION

.1 Install units in accordance with the manufacturer's instructions and recommendations, the reviewed and accepted shop drawings, and as specified herein.

.2 Ensure that units are in full contact with base. Take proper care to develop straight lines and smooth curves on the base course in accordance with the wall layout.

.3 Fill all cores and cavities and a minimum of 300 mm behind the base course with wall rock. Use infill soils behind the wall rock and approved soils in front of the base course to firmly lock in place. Check again for level and alignment. Use a plate compactor to consolidate the area behind the base course. Sweep all excess material from top of units.

.4 Install next course of wall units on top of base course. Position blocks so that vertical seams are offset from seams of blocks below. Perfect "running bond" is not essential, but the offset shall be 75 mm minimum. Check each block for proper alignment and level. Fill all cavities in and around wall units and to a minimum of 300 mm depth behind block with wall rock. For taller wall application the depth of wall rock behind the block should be increased; refer to the reviewed and accepted shop drawings and the manufacturer's recommendations for each specific condition. Spread infill soil in uniform lifts not exceeding 200 mm in uncompacted thickness and compact to 95% of Standard Proctor (ASTM D698) behind the consolidation zone.

.5 The consolidation zone is defined as 0.9 m behind the wall. Compaction within the consolidation zone shall be accomplished by using a hand operated plate compactor and shall begin by running the plate compactor directly on the block and then compacting in parallel paths from the wall face until the entire consolidation zone has been compacted. A minimum of two passes of the plate compactor are required with maximum lifts of 200 mm. Expansive or fine-grained soils may require additional compaction passes and/or specific compaction equipment such as a sheepsfoot roller. Maximum lifts of 100 mm may be required to achieve adequate compaction within the consolidation zone. Employ methods using lightweight compaction equipment that will not disrupt the stability or batter of the wall. Final compaction requirements in the consolidation zone shall be established by the engineer responsible for the shop drawings.

.6 Install each subsequent course in like manner. Repeat the procedure to top of the wall.

3.7 TOLERANCES

.1 Erect the wall within the following tolerances:
- .1 Vertical Control - ±32 mm maximum over a 3 m distance.
- .2 Horizontal Location Control - straight lines ±32 mm over a 3 m distance.
- .3 Rotation - from established plan wall batter: 2° maximum.
- .4 Bulging - 25 mm over a 3.0 m distance.

3.8 GRADING

.1 Establish final grade with a positive gradient away from the wall structure.

.2 The grading design must divert sources of concentrated surface flow away from the wall.

3.9 SUBGRADE DRAINAGE

.1 Install a subgrade drainage system in accordance with the reviewed and accepted shop drawings.

.2 Construct the wall with a minimum of 300 mm of wall rock directly behind the wall facing.

.3 Install a drainage collection pipe as specified by the engineer responsible for the shop drawings, placed at the lowest possible elevation within the 300 mm of wall rock. This drain pipe is referred to as a toe drain.

3.10 TESTING AND INSPECTION

.1 The Construction Manager will appoint an independent inspection and testing Agency to conduct soil compaction tests during the progress of the work.

.2 The cost of initial inspection and testing will be paid by the Owner. The cost of re-testing/re-inspection necessitated by failure to meet specification requirements on the initial inspection/test shall be paid by the Contractor.

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

END OF SECTION

INSERT OTHER DIVISION 32 SECTIONS

[by Civil Engineer and Landscape Architect]

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:
- .1 The work of this Section includes the provision of all labour, materials, equipment and services required to install perimeter foundation drainage, as indicated on the drawings, as specified herein and as required for a complete project.
- .2 The work includes, but is not necessarily limited to, the following:
  - .1 Perimeter weeping tile system, integrated with drainage composite installation and connected to the existing foundation drainage system.
  - .2 Drainage composite applied over the waterproofed surface of the foundation walls, extending from the footing up to 50 mm below finished grade elevation.

.2 Related Work
- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 31 23 10 - Excavation, Trenching and Backfilling.
- .3 Section 07 13 26 - Self-Adhering Sheet Waterproofing.

1.3 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM):
- .1 ASTM C117-13, Standard Test Method for Materials Finer than 75 µm (No. 200 Seive) in Mineral Aggregates by Washing.
- .2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D1248-12, Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Cooperate with the Construction Manager's waste management coordinator and separate and recycle waste materials, including packaging materials in accordance with Section 01 74 21 "Waste Management and Disposal" and the Waste Management Plan specified therein.

Part 2 Products

2.1 MANUFACTURERS

.1 This specification is based on polyethylene tubing and fittings Armtec 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 Perforated corrugated high density polyethylene tubing and fittings:
- .1 Material: High density polyethylene resin to ASTM D1248 Type III, Category 4 or 5, Grade P33 or P34, Class C.
- .2 Pipe diameter: 150 mm nominal, except where otherwise indicated.
- .3 Joints: Snap, insert or split couplers, as recommended by pipe manufacturer.
- .4 Sock: All drainage pipes to be encased in a continuous geotextile sock, filter.

.2 Filter bed: 19 mm clear crushed stone as specified in Section 31 23 10 "Excavating, Trenching and Backfilling".

.3 Drainage Composite: 1200 mm wide purpose-made drainage composite consisting of:
- .1 10 mm high-impact, dimpled polystyrene drainage core.
- .2 94 g/m^2, non-woven, needle-punched filter fabric integrally bonded to the outward face of the core.

.4 Drainage composite accessories: Manufacturer's recommended products as follows:
- .1 Self-adhesive cross-laminated polyethylene / rubberized asphalt tape.
- .2 Rubber-based primer, dispersed in solvent, designed to provide good adhesion for tape or other primer as recommended for the specific application.
- .3 Rubber-based mastic
- .4 Rubber-based adhesive.
- .5 Adhesive-attached spindle anchors to penetrate through foundation insulation and receive disc-type retaining devices for fastening of drainage composite over the foundation insulation.

Part 3 Execution

3.1 INSPECTION

.1 Ensure graded subgrade conforms with the required drainage pattern before placing the filter bed material.

.2 Report to the Consultant improper slopes, unstable areas, areas requiring additional compaction or other unsatisfactory conditions.

.3 Before installing the drainage composite and the perimeter weeping tile system, ensure foundations and foundation dampproofing have been reviewed by the Consultant.

.4 Ensure that substrate to receive drainage composite is dry and free of dirt and other contaminations which would otherwise inhibit the proper securement of the drainage composite.

.5 Begin installation of foundation drainage after deficiencies have been corrected.

3.2 COORDINATION

.1 Coordinate with the cast-in-place concrete installer to schedule the installation of the underslab drainage system and review and acceptance by the Consultant prior to pouring the floor slab.

.2 Coordinate with Section 31 23 10 "Excavating, Trenching and Backfilling" and schedule the work so that backfilling is executed immediately after inspection and acceptance by the Consultant of the drainage composite and perimeter weeping tile installation.

3.3 DRAINAGE COMPOSITE INSTALLATION

.1 Apply drainage composite over the entire surface of the wall from the footing to 100 mm above the elevation of the site grading, in accordance with the manufacturer's instructions.

.2 Apply drainage composite, starting at the bottom of the wall, as indicated.

.3 Carefully peel the filter fabric back approximately 300 mm from the lower edge and tuck the exposed drainage core around behind the foundation drainage pipe, down the outside face of the footing. Wrap the filter fabric around the outside of the pipe to ensure no soil or fine aggregate can enter the system.

.4 Adhere the drainage composite to the substrate with strips of adhesive, self-adhering tape, or mastic.

.5 At the top edge, tuck the excess filter fabric around behind the drainage core to prevent soil infiltration and seal to the wall with adhesive, self-adhering tape, or mastic.

.6 At inside corner locations, cut the drainage core but do not cut the filter fabric.

.7 At outside corners, cut the entire drainage composite and cover cut ends with fabric or tape. Take care to adhere overlapping fabric.

.8 Prior to backfilling, repair any damaged drainage composite with fabric and/or drain core material, as appropriate.

.9 Arrange for inspection of the installation by the Consultant as soon as possible after completion so that backfilling can be expedited. Do not backfill until acceptance of the foundation and underslab drainage installation by the Consultant.

3.4 PIPE LAYING

.1 Provide complete foundation drainage system around the perimeter of the foundation wall and under the slab-on-grade, in accordance with the drawings.

.2 Ensure pipe interior and coupling surfaces are clean before laying.

.3 Lay drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points.

.4 Commence laying at outlet and proceed in upstream direction.

.5 Lay with face perforations and coupling slots downward.

.6 Use fittings recommended by manufacturer. Make joints tight in accordance with the manufacturer's instructions.

.7 Do not use shims to establish pipe slope.

.8 Where applicable, place pipe immediately adjacent to footings.

.9 Connect to the existing foundation drainage system.

.10 Encase pipes in a continuous filter-fabric sock.

.11 Protect pipe ends from damage and ingress of foreign material. Plug upstream ends of pipes with plastic plugs.

.12 Provide flush cleanouts at all changes of building direction and in pipe runs greater than 15 m.

.13 Provide back-flow valves where required to prevent backing up.

3.5 DRAINAGE FILL BED BACKFILL:

.1 Place filter bed backfill after pipe installation is reviewed by the Consultant.

.2 Place minimum of 300 mm thickness coarse filter aggregate over perforated pipe.

.3 Extend filter aggregate to and along foundation wall minimum 300 mm above top of pipe.

.4 Place filter bed by hand, in 150 mm lifts. Consolidate by hand tamping lightly. Prevent displacement of pipe.

END OF SECTION

INSERT OTHER DIVISION 33 SECTIONS

[by Civil Engineer]