KIRKOR ARCHITECTS + PLANNERS

ARCHITECTURAL SPECIFICATIONS

AQUAVISTA
AT BAYSIDE TORONTO

FOR

TRIDEL | HINES

AQUAVISTA

263 QUEENS QUAY EAST
TORONTO, ONTARIO

ISSUED FOR	DATE
1. ISSUED FOR TENDER	**OCTOBER 15, 2015**

TRIDEL

Hines

DOCUMENT 0 - PROCUREMENT AND CONTRACTING REQUIREMENTS

Document	Title	DR	Pages
00 01 10	Table of Contents	A	4

DIVISION 1 - GENERAL REQUIREMENTS

Section	Title	DR	Pages
01 10 10	General Requirements	A	35
01 35 15	LEED Building Requirements	LEED	3
01 57 13	Temporary Erosion Sedimentation Control	LEED	3
01 57 21	Construction IAQ Management Plan	LEED	4
01 60 00	Recycled and Regional Materials	LEED	5
01 60 00	Recycled and Regional Materials TGS	LEED	5
01 61 16	Indoor Air Quality Requirements	LEED	7
01 74 19	Construction Waste Management	LEED	4
01 74 19	Construction Waste Management TGS	LEED	4

DIVISION 2 - SITE WORK

Section	Title	DR	Pages
02 32 00	Geotechnical Information	A	1

DIVISION 3 - CONCRETE

Section	Title	DR	Pages
03 48 19	Precast Concrete Stairs	A	7
03 51 13	Cementitious Topping	A	3

DIVISION 4 - MASONRY

Section	Title	DR	Pages
04 20 00	Unit Masonry	A	12
04 42 00	Exterior Stone Cladding	A	8

DIVISION 5 - METALS

Section	Title	DR	Pages
05 41 00	Load-Bearing Metal Studs	A	5
05 50 00	Miscellaneous and Metal Fabrications	A	9
05 52 00	Glazed Balcony Railings and Dividers	A	6

DIVISION 6 - WOOD AND PLASTICS

Section	Title	DR	Pages
06 10 00	Rough Carpentry	A	6
06 20 00	Finish Carpentry	A	8

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

Section	Title	DR	Pages
07 13 00	Sheet Waterproofing	A	4
07 13 90	Blind-Side Waterproofing	A	7
07 14 00	Fluid Applied Waterproofing	A	8
07 15 57	Concrete Tank Waterproofing	A	5
07 16 00	Crystalline Waterproofing	A	6
07 18 00	Traffic Coatings	A	7
07 19 00	Water Repellant Sealer	A	5
07 21 00	Thermal Insulation	A	5
07 24 00	Exterior Insulation and Finish System	A	8
07 26 00	Air/Vapour Retarders	A	5
07 27 00	Vapour Permeable Air Barrier	A	4
07 40 25	Exterior Soffit System	A	4
07 55 65	Green Roof System	A	5
07 56 00	Fluid Applied Roofing	A	7
07 62 00	Flashing and Sheet Metal	A	3
07 85 00	Firestopping and Smoke Seals	A	5
07 92 00	Sealants	A	5

DIVISION 8 - DOORS AND WINDOWS

Section	Title	DR	Pages
08 11 13	Metal Doors and Frames	A	8
08 11 16	Aluminum Doors, Frames, and Screens	A	7
08 14 16	Wood Doors	A	4
08 14 73	Sliding Closet Doors	A	3
08 33 00	Overhead Coiling Doors	A	6
08 36 13	Sectional Overhead Door	A	6
08 42 29	Sliding Automatic Doors	A	9
08 42 33	Revolving Doors	A	8
08 44 00	Curtain Wall	A	10
08 45 00	Window Wall Work	A	12
08 70 00	Finish Hardware	A	5
08 71 13	Automatic Door Equipment	A	4
08 80 00	Glazing	A	7
08 80 50	Interior Glazing	A	6
08 91 00	Louvres	A	3

DIVISION 9 - FINISHES

Section	Title	DR	Pages
09 21 16	Gypsum Board	A	15
09 30 00	Tile	A	8
09 6400	Wood Flooring	A	5
09 65 19	Resilient Tile Flooring	A	5
09 67 70	Waterproof Flooring	A	5
09 67 72	Concrete Floor Sealer	A	4
09 68 00	Carpet	A	4
09 91 00	Painting	A	10
09 94 13	Textured Ceiling Finish	A	3

DIVISION 10 - SPECIALTIES

Section	Title	DR	Pages
10 22 13	Wire Mesh Partitions	A	3
10 28 13	Washroom Accessories	A	4
10 55 23	Mailboxes	A	3
10 80 00	Miscellaneous Specialties	A	3

DIVISION 11 - EQUIPMENT

Section	Title	DR	Pages
11 24 23	Window Washing Systems	A	7
11 82 00	Waste Compactor and Garbage Chute	A	7

DIVISION 13 - SPECIAL CONSTRUCTION

Section	Title	DR	Pages
13 48 23	Vibration Control Floating Floor	A	5

DIVISION 22 - PLUMBING

Section	Title	DR	Pages
See attached Mechanical Table of Contents.		M	

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING

Section	Title	DR	Pages
See attached Mechanical Table of Contents.		M	

DIVISION 26 - ELECTRICAL

Section	Title	DR	Pages
See attached Electrical Table of Contents		E	

DIVISION 31 - EARTHWORK

Section	Title	DR	Pages
31 00 00	Earthwork	A	10

DIVISION 32 - EXTERIOR IMPROVEMENTS

Section	Title	DR	Pages
32 12 16	Asphaltic Concrete Paving	A	6
32 16 13	Concrete Curbs and Pavements	A	10
32 17 23	Painted Traffic Lines	A	3
32 31 13	Chain Link Fencing	A	4

DIVISION 33 - UTILITIES

Section	Title	DR	Pages
33 46 13	Foundation Drainage	A	3

END OF DOCUMENT

CONTENTS

This Section includes the following Articles on pages as listed below:

- Description of the Project 2
- General 2-3
- Use of Premises and Site 3
- Owner Occupancy 4
- Existing Site Conditions 4
- Access/Property Constraints 4
- Coordination 5-6
- Cutting and Patching 6-7
- Preconstruction Meeting 7
- Progress Meetings 7-8
- Scheduling 9
- Submittals 9-10
- Product Data 10
- Samples 11
- Shop Drawings 11-14
- Certificates 14
- Extended Warranties 14
- Regulatory Requirements 15
- Codes 15
- Standards 15-16
- Fire Ratings 16
- Quality Control 16
- Inspection and Testing by the Construction Manager 17
- Inspection and Testing 17
- Qualifications of Inspection and Testing Companies 17
- Reference Standards 18
- Responsibilities of the Trade Contractor 18
- Responsibilities of Inspection and Testing Companies 18
- Inspection and Testing Procedures 18-19
- Mock Ups 19
- Defects 19
- Specified Products 20
- Substitutions 20-21
- Approval of Products and Installation Methods 22
- Availability 22
- Trademarks and Labels 22
- Delivery, Storage, Handling and Protection 22-24
- Manufacturer's Instructions 24
- Workmanship 24-25
- Dimensions 25-26
- Tolerances for Installation of Work 26
- Expansion, Contraction and Deflection 26-27
- Dielectric Separation 27
- Fastenings 27
- Adjusting 27-28
- Layout and Survey 28

- Garbage Disposal and Cleanup 29
- Cleaning 29
- Demonstration and Inspection of Products and Systems 30
- Final Inspections and Close Out 30
- Operation and Maintenance Manuals 30-33
- Progress Records 33
- Record Drawings 33-34
- Dust Control 34-35

1 DESCRIPTION OF THE PROJECT

1.1 No person(s), firm or corporation other than the Construction Manager and their Subcontractor(s) have any interest in this Contract, or in the proposed Subcontractors.

1.2 It is intended that work supplied under this Specification shall be complete in every detail for the purpose required. This Contract shall include materials not herein mentioned, but which may be found necessary to complete or perfect any portion of Work in accordance with requirements and intent of this Specification. Work not specified or shown in either the Drawings or in Specifications, but involved in carrying out their intent, or in the complete and proper execution of the work, is required and shall be performed by the Construction Manager as though it were specifically delineated or described.

2 GENERAL

2.1 The requirements of the Articles of Agreement, Conditions of the Contract, Division 1 apply to and form all Sections of the Contract Documents and the Work.

2.2 Work in this Specification is divided into descriptive sections which are not intended to identify absolute contractual limits between Subcontractors, nor between the Trade Contractor and their Subcontractors. The Trade Contractor is responsible for organizing division of labour and supply of materials essential to complete the Contract.

2.3 Specifications, Schedules and Drawings are complementary and items mentioned or indicated on one may not be mentioned or indicated on the others.

2.4 Mention in the specifications or indicate on the drawings, materials, products, operations, or methods, requiring that the Trade Contractor provide each item mentioned or indicated to the quality or subject to the qualifications noted. Perform, according to the conditions stated, each operation prescribed, and provide labour, materials, Products, equipment and services to complete the Work.

2.5 Where the singular or masculine is used in the Contract Documents, it shall be read and construed as if the plural, feminine or neuter had been used when the context or the statement so requires and as required to complete the Work, and the rest of the sentence, clause, paragraph, or Article shall be construed as if all changes in grammar, gender or terminology thereby rendered necessary had been made.

2.6 The terms “exposed” or “exposed to view” refers to surfaces that are within the line of vision of persons from any accessible viewpoint, both within and without the building. Where any part of a surface is exposed to view, all other portions of that surface shall also be considered as exposed to view.

2.7 The intent of this project is to achieve LEED certification. It is the Contractor’s responsibility to coordinate construction and submit all required documentation for the credits that are being obtained. LEED requirements of this Project to conform to LEED Sections as follows:

.1 Section 01 35 15 - LEED Building Requirements

.2 Section 01 57 13 - Temporary Erosion and Sedimentation Control

.3 Section 01 57 21 - Construction IAQ Management Plan

.4 Section 01 60 00 - Recycled and Regional Materials

.5 Section 01 60 00 - Recycled and Regional Materials TGS

.6 Section 01 61 16 - Indoor Air Quality Requirements

.7 Section 01 74 19 - Construction Waste Management

.8 Section 01 74 19 - Construction Waste Management TGS

3 USE OF PREMISES AND SITE

3.1 The work shall be confined to the area defined on the drawings except that services connections and certain portions of landscaping, hard paving and curb work shall be executed on Municipal property under regulations of Authorities having Jurisdiction.

3.2 Certain restrictions exist as to the use by the trades of various portions of the place of work. The trades shall familiarize themselves with these restrictions and shall establish their work plan to accommodate these restrictions. No claims for extra costs due to such restrictions will be considered by the Owner.

3.3 Individual trades shall have partial use of premises for performance of the Work, in which case trades shall assume responsibility for premises assigned to them for performance of the Work.

3.4 Traffic or storage of materials, debris, offices, storage sheds, is permitted only in locations specifically designated by Construction Manager; use only access routes to and from such storage areas as permitted by Construction Manager.

3.5 Trades shall limit their use of premises to areas as designated by Construction Manager.

4 OWNER OCCUPANCY

4.1 The Owner reserves the right to occupy and use portions of the premises, whether partially or entirely completed, or whether completed on schedule or not, provided such occupancy does not interfere with the trade's continuing work.

4.2 Partial occupancy or installation by the Owner of his equipment shall not imply acceptance of the Work in whole, or in part, nor shall it imply acknowledgment that terms of the agreement are fulfilled.

4.3 The trades shall not be entitled to indemnity for interference with performance of the Work due to Owner's occupancy of areas of Project prior to Completion of the Contract, but after date of Substantial Performance.

5 EXISTING SITE CONDITIONS

5.1 Make a careful examination of the site, and investigate and be satisfied as to all matters relating to the nature of the Work to be undertaken, as to the means of access and egress thereto and therefrom, as to the obstacles to be met with, as to the extent of the Work to be performed and any and all matters which are referred to in the Contract Documents.

5.2 Report any inconsistencies, ambiguities, discrepancies, omissions, and errors between Site conditions and Contract Documents to the Construction Manager prior to the commencement of Work. If inconsistencies, ambiguities, discrepancies, omissions, and errors are not reported and clarified, the most stringent requirement shall govern, as determined by the Construction Manager.

6 ACCESS/PROPERTY CONSTRAINTS

6.1 Confine Work and operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with products.

6.2 Organize delivery of materials/equipment to and removal of debris and equipment from place of Work to permit continual progress of work and suitable for restricted site conditions.

6.3 Determine and make arrangement as required for loading and unloading of equipment and Products with the Construction Manager. Conform to Owner's requirements with regard to parking restrictions and other conditions.

6.4 All Products, materials and equipment required on Site shall be portable and/or size suitable for access and movement on Site and without causing damage to buildings.

6.5 Personnel access and material deliveries to the Site shall be only by routes designated by the Construction Manager.

7 COORDINATION

7.1 Cooperate and coordinate with Other Trade Contractors including Other Trade Contractors employed by Owner. Ensure that Subtrades coordinate their work to have the Work performed expeditiously and to be satisfactory in all respects at completion. Ensure cooperation of workers in laying out and performing Work. Maintain efficient and continuous supervision.

7.2 Ensure that subtrades cooperate with other subtrades whose work attaches to or is affected by their own work. Ensure that minor adjustments are made to make adjustable work fit fixed work.

7.3 Ensure subtrades coordinate and make reasonable provision in the work for the work of other subtrades including splicing and sequencing of installation at no extra cost to the Owner.

7.4 Allow access of Other Trade Contractors on Site and to areas of Work. Cooperate and coordinate with such Other Trade Contractors. Schedule work to complement work of such Other Trade Contractors.

7.5 Placing, installation, application and connection of work by the Owner’s own forces or by Other Trade Contractors on and to the Trade Contractor's Work shall not relieve the Trade Contractor of his responsibility to provide and maintain the specified warranties.

7.6 Coordinate with removals/installations specified in other Divisions and Other Contracts.

7.7 Pay particular attention to types of ceiling construction and clearances throughout, especially where recessed fixtures are required. Coordinate work with Other Trade Contractors and Subtrades wherever ventilation ducts or piping installations occur to ensure that conflicts are avoided.

7.8 Install ceiling mounted components in accordance with final ceiling plans. Inform Construction Manager of conflicting installations.

7.9 Install and arrange ducts, piping, tubing, conduit, equipment, fixtures, materials and products to conserve headroom and space with minimum interference and in neat, orderly and tidy arrangement. Run pipes, ducts, tubing and conduit, vertical, horizontal and square with building grid unless otherwise indicated. Install piping, ducts, and conduit as close to underside of structure as possible unless shown otherwise.

7.10 Make provision for unrestricted relocation of light fixtures to replace ceiling panels at grid spaces of the same size, without interference or restriction by items located within the ceiling space.

7.11 Where supports or openings are to be left for the installation of various parts of the Work furnish the necessary information to those concerned in ample time so that proper provision can be made for such items. Have cutting, drilling and other remedial work, and the subsequent patching or other work required for failing to comply with this requirement, performed at a later date at no additional Cost to Owner.

7.12 Ensure that setting drawings, templates, and all other information necessary for the location and installation of materials, fixtures, equipment, holes, sleeves, inserts, anchors, accessories, fastenings, connections, and access panels are provided by each Section whose work requires cooperative location and installation by other Sections, and that such information is communicated to the applicable installer. Have cutting, fixing and making good to the work of Other Trade Contractors, Subtrades required for, and make up time lost as result of, failure to comply with this requirement, at no additional cost to Owner.

7.13 Be responsible for coordinating products supplied in metric (SI) and imperial units into the overall layout.

7.14 Properly coordinate the work of the various Sections and trades to assure the best arrangement of pipes, conduits, ducts and mechanical, electrical and other equipment, in the available space. Under no circumstances will any extra payment be allowed due to the failure by the Trade Contractor to coordinate the Work. If required, in critical locations, prepare interference and/or installation drawings showing the work of the various Sections as well as the existing installation, and submit these drawings to the Construction Manager for review before the commencement of Work.

7.15 In case of damage to active services or utilities, notify Construction Manager and respective authorities immediately and make all required repairs under direction of Construction Manager and respective authorities. Carry out repairs to such damaged services and utilities continuously to completion, including working beyond regular working hours.

8 CUTTING AND PATCHING

8.1 Execute Work to avoid damage to other Work.

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

8.3 Employ appropriate trades with skilled labour to perform cutting Work.

8.4 Fit Work segments together, to integrate with penetrations through surfaces and with other Work.

8.5 Remove and replace defective and non-conforming Work.

8.6 Do any drilling, cutting, fitting, patching and finishing that may be required to make the various classes and kinds of other Work fit together in a professional and finished manner. Make watertight connections with adjoining structures.

8.7 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

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

8.9 Cut Products using proper equipment and methods. On rigid materials, use a masonry saw or core drill. Pneumatic or impact tools are not allowed on masonry work without prior approval.

8.10 Where new Work connects with existing structures, cut, patch and make good existing work to match original condition.

8.11 Be responsible for correct formation and bridging of openings in masonry and structural walls as required.

8.12 Ensure compatibility between installed Products and the ensure security of installation.

8.13 Restore Work with new Products in accordance with requirements of the Contract Documents.

8.14 Fit Work airtight to pipes, sleeves, ducts, conduits and other penetrations through surfacs.

8.15 Properly prepare surfaces to receive patching and finishing.

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

9 PRECONSTRUCTION MEETING

9.1 Within 3 days after award of Contract, the Construction Manager will arrange a Preconstruction meeting of parties in the Contract to discuss and resolve administrative procedures and responsibilities at the Owners' offices, and set all construction meetings for each portion of the project.

10 PROGRESS MEETINGS

10.1 The Construction Manager's Project Manager shall schedule, administrate and chair all site meetings every 2 weeks (or more often as required) which shall be attended by the Owner throughout the progress of the Work. Schedules shall be update every 2 weeks by the Site Superintendent for distribution at each meeting.

10.2 Attend regularly scheduled progress meetings to be held on Site at times and dates that are mutually agreed to by the Owner, Construction Manager, and Trade Contractor.

10.3 Co-ordinate and organize attendance of individual subtrades and material suppliers when requested. Relationships and discussions between subtrades participants are not the responsibility of the Construction Manager and do not form part of the meetings content.

10.4 Ensure that Trade Contractor representatives in attendance at meetings have required authority to commit Trade Contractor to actions agreed upon. Assign same persons to attend such meetings throughout the contract period.

10.5 The Project Manager shall prepare the Agenda for all site meetings in consultation with the Consultant's Contract Administrator, and shall distribute written, either via fax or by e-mail, notice of each meeting minimum 4 days in advance of meeting date to all parties required to attend.

10.6 Be prepared to provide specific information relative to agenda items at each meeting as they are pertinent to the Contract.

10.7 Agenda will include but not be limited to the following topics as are pertinent to the Contract.

.1 Review and agreement of previous minutes.

.2 Safety.

.3 Status of submittals.

.4 Quality control.

.5 Co-ordination.

.6 Contract Schedule

.7 Work plan up to next scheduled meeting.

.8 Requests for information/clarification.

.9 Contemplated changes.

10.8 Construction Manager shall record minutes of meeting and distribute type written copies to all participants and other interested parties, within one week of meeting date.

11 SCHEDULING

11.1 Be responsible for planning and scheduling of the Work. Be responsible for ensuring that subtrades plan and schedule their respective portions of the Work. Subtrades schedules shall form part of the above mentioned schedules.

11.2 Prepare and submit the Contract Schedule within two weeks following award of Contract. This schedule, once it is reviewed by the Construction Manager and if it meets the Construction Manager's project requirements, will become contractual.

11.3 The Contract Schedule shall be developed using a logic network technique for planning and scheduling.

11.4 The Contract Schedule shall be submitted for approval in its optimum levelled form. This presentation may be in either a time scaled network or a bar chart form. It shall be subdivided into either work areas or systems as applicable.

11.5 The Contract Schedule shall include the following information:

.1 Starting and ending dates of each activity including the float periods;

.2 Manpower requirements for each activity;

.3 Interdependency with activities of other Trade Contractors;

.4 Dates specified in the Contract Documents;

.5 Dates on which specific data will be required for submittal, i.e., Vendor data, drawings for review, etc.

11.6 This schedule shall be reviewed and updated monthly by the Trade Contractor so as to reflect any Contract changes as well as major changes to the schedule.

12 SUBMITTALS

12.1 Provide labour, Products, equipment, services tools and supervision necessary for submittals. Make submittals specified in this Section to Construction Manager unless otherwise specified.

.1 Verify accuracy and completeness of submittals prior to submission.

.2 Verify field measurements, field construction criteria, catalogue numbers and similar data.

.3 Co-ordinate each submittal with requirements of the Work and the Contract Documents.

.4 Notify Construction Manager in writing at time of submission, of any deviation in submittals from requirements of the Contract Documents.

12.2 Submit in accordance with dates established; shop drawings, fabrication, manufacture, erection and installation to provide adequate time for reviews, securing necessary approvals, possible revisions and resubmittals, placing orders, securing delivery and to avoid construction delays.

12.3 Accompany each submittal with a letter of transmittal in duplicate containing all pertinent information required for identification and checking of submittals including but not limited to the following:

.1 Date of initial submission and date of each subsequent submission if required.

.2 Project title and Construction Manager's project number.

.3 Names of:
- .1 Trade Contractor.
- .2 Subtrades.
- .3 Supplier/manufacturer as applicable.

.4 Specification section numbers to which submission is related.

.5 Countersigned stamp of Trade Contractor certifying that they have reviewed the submission.

12.4 Allow two week for the Construction Manager's review of each submission.

12.5 When submittals are resubmitted, transmit under a new letter of transmission.

12.6 Do not carry out Work until Consultants review of submittals has been completed.

12.7 Be responsible for payment of charges for delivery of submissions and resubmission to Construction Manager.

13 **PRODUCT DATA**

13.1 Before delivery of Products to the Site, submit Product data as specified in each section or as requested by the Construction Manager.

13.2 Submit manufacturer's Product data for systems, materials, and methods of installation proposed for use. Such literature shall identify systems, each component, and shall certify compliance of each component with applicable standards.

14 **SAMPLES**

14.1 Before delivery of Products to the Site, submit samples of Products as specified or as requested by the Construction Manager. Label samples as to origin and intended use in the Work and in accordance with the requirements of the Specification Sections. Samples must represent physical examples to illustrate materials, equipment or work quality and to establish standards by which completed Work is judged.

14.2 Ensure samples are of sufficient size and quantity, if not already specified, to illustrate:

.1 The quality and functional characteristics of Products, with integrally related parts and attachment devices.

.2 Full range of colours available.

14.3 Notify the Construction Manager in writing, at time of submission, of any deviations in samples from requirements of the Contract Documents, and state the reasons for such deviations.

14.4 Identify samples with Project name, Contract number, date, Trade Contractor's name, number and description.

14.5 If samples are not acceptable, both samples will be returned. If samples are acceptable, one sample will be so indicated and returned. Be responsible for the cost of samples that are not accepted and for resubmission of samples.

14.6 Acceptable samples shall serve as a model against which the products incorporated in the work shall be judged.

14.7 Each Product incorporated in the Work shall be precisely the same in all details as the acceptable sample.

14.8 Should there is any change to the accepted sample, submit in writing for approval of the revised characteristics and resubmit samples of the Product for approval if requested.

14.9 When samples are very large, require assembly, or require evaluation at the Site, they may be delivered to the Site, but only with approval and as directed.

15 **SHOP DRAWINGS**

15.1 Arrange for the preparation of shop drawings as called for in the Contract Documents or as may be reasonably requested by the Construction Manager. The Trade Contractor and each Subtrade shall operate as experts in their respective fields and all shop drawings and samples shall conform to the requirements of the Contract Documents.

15.2 The term "shop drawings" means drawings, diagrams, schematics, illustrations, schedules, performance charts, brochures and other data which are required to illustrate details of the Work.

15.3 In addition to shop drawings specified in the specification sections, submit shop drawings required by jurisdictional authorities in accordance with their requirements.

15.4 Shop drawings shall indicate the following minimum criteria and any additional criteria indicated in the individual specification sections requiring shop drawings:

.1 Clear and obvious notes of any proposed changes from the Contract Documents.

.2 Fabrication and erection dimension.

.3 Provisions for allowable construction tolerances and deflections provided for live loading.

.4 Details to indicate construction arrangements of the parts and their connections, and interconnections with other work.

.5 Location and type of anchors and exposed fastenings.

.6 Materials, physical dimensions including thicknesses, and finishes.

.7 Descriptive names of equipment.

.8 Mechanical and electrical characteristics when applicable.

.9 Information to verify that superimposed loads will not affect function, appearance, and safety of the work detailed as well as of interconnection work.

.10 Assumed design loadings, and dimensions and material specifications for load-bearing members.

15.5 Include in shop drawing submissions detailed information, templates, and installation instructions required for incorporation and connection of the Work.

15.6 Before submitting to the Construction Manager, review all shop drawings to verify that the Products illustrated therein conform to the Contract Documents. By this review, the Trade Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers and similar data and that it has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents. The Trade Contractor's review of each shop drawing shall be indicated by stamp, date and signature of a qualified and responsible person possessing the appropriate authorization.

15.7 Be responsible for dimensions to be confirmed and correlated at the Site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the Work of all subtrades.

15.8 Submit shop drawings for the Construction Manager's review with reasonable promptness and in orderly sequence so as to cause no delay in the Work nor in the work of Other Trade Contractors. At the time of submission, notify the Construction Manager in writing of any deviations in the shop drawings from the requirements of the Contract Documents. The Trade Contractor will be held responsible for changes made from the Contract Documents which are not indicated or otherwise communicated in writing with the submission.

15.9 Drawings submitted by the Trade Contractor as required herein are the property of the Owner who may use and duplicate such drawings where required in association with the Work.

15.10 Submit shop drawings, as indicated in each section of the Work, signed and sealed by a licensed Professional Engineer registered in the place of the Work.

15.11 Shop drawings shall have distinct, uniform letters, numerals and line thicknesses that will ensure the production of clear legible prints and also facilitate microfilming and reduced reproduction.

15.12 Submissions shall consist of one set of reproducible prints and 3 sets of prints with each sheet folded into 216 mm x 280 mm size with title block appearing on outside. However, in instances where catalogue items are specified, three clean copies of the manufacturer's catalogue may be submitted.

15.13 Shop drawings shall contain the following identification:

.1 Project name and Contract number.

.2 Applicable 6-digit Contract Specification number describing the item.

.3 Location (unit, level, room number, etc.).

.4 Name of equipment or Product.

.5 Name of Trade Contractor, Subtrade or supplier.

.6 Signature of Trade Contractor certifying that Shop drawing is in conformance with Contract Documents.

.7 On submissions subsequent to the first, the following additional identification:
- .1 The revision number.
- .2 Identification of the item(s) revised.

15.14 Dimensions and designations of elements shall be shown in the same system of measurement used on the applicable Contract Drawings.

15.15 The Construction Manager reserves the right to refuse acceptance of drawing submissions not meeting the above requirements.

15.16 The Consultants review will be for conformity to the design concept and for general arrangement only 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 unless a deviation on the shop drawings has been approved in writing by the Consultant.

15.17 The Trade Contractor shall make any changes in shop drawings which the Consultant may require consistent with the Contract Documents and re-submit unless otherwise directed. When re-submitting the shop drawings, the Trade Contractor shall notify the Consultant in writing of any revisions other than those requested.

15.18 Only drawings noted for revision and resubmission need be resubmitted.

15.19 File one copy of each submitted shop drawing at the Site.

16 **CERTIFICATES**

16.1 Submit certificates that are required by authorities having jurisdiction or that are requested in the specification sections.

16.2 Clearly show on each certification the name and location of the Work, name and address of Trade Contractor, quantity and date of shipment and delivery and name of certifying company.

16.3 Certificates shall verify that Products and/or methods meet the specified requirements and shall include test reports of acceptable testing laboratories to validate certificates.

16.4 Submit certificates in duplicate and signed by an authorized representative of the certifying company.

17 **EXTENDED WARRANTIES**

17.1 Submit extended warranties as requested in sections of the Specifications showing title and address of Contract, warranty commencement date and duration of warranty.

17.2 Extended warranties shall commence on termination of the standard warranty specified in the conditions of the contract and shall be an extension of these provisions. Clearly indicate what is being warranted and what remedial action is to be taken under the warranty. Ensure warranty bears the signature and seal of the Trade Contractor.

17.3 Submit each extended warranty on a form that is acceptable to the Owner and Construction Manager.

18 **REGULATORY REQUIREMENTS**

18.1 Provide Labour, Products, equipment, services, tools and Supervision to ensure that Work complies with minimum acceptable standards of materials and performance of Work in accordance with codes and standards referenced in the Specification.

18.2 Consider contract forms, codes, Specifications, standards, manuals, and installation and application instructions referred to in these specifications to be the latest published editions at the date of submission of the bid unless otherwise stated in the Specifications or otherwise required by the authorities having jurisdiction.

19 **CODES**

19.1 Reference is made to standards in the specifications to establish minimum acceptable standards of materials, products and workmanship. Ensure that materials, products and workmanship meet or exceed requirements of the reference standards specified.

19.2 In the event of conflict between documents specified herein, execute the Work in accordance with the most stringent requirements.

20 **STANDARDS**

20.1 Where a material is specified in conjunction with a referenced standard, do not supply the material or product if it does not meet the requirements of the standard. Supply another specified material or product, or an acceptable material or product of other approved manufacture which does meet the requirements of the standard, at no additional cost to the Owner.

20.2 Where no standard is referred to, provide materials, products and workmanship which meet requirements of the applicable standards of the Canadian Standards Association, Canadian General Standards Board, Standards Council of Canada, Ontario Provincial Standard Specifications (OPSS), Ontario Provincial Standard Drawings (OPSD) and the applicable building code. References to "Measurement for Payment" and "Basis of Payment" in OPSS standard documents are not applicable to this Contract.

20.3 If there is question as to whether a material, product or system is in conformance with applicable standards, the Construction Manager reserves the right to have such materials, products or systems tested to prove or disprove conformance. The cost for such testing will be paid by the Owner in the event of conformance with contract Documents or by the Trade Contractor in the event of non-conformance.

20.4 Where application, installation and workmanship standards are cited, it is intended that referenced standards form the basis for minimum requirements of the specified item and specifications supplement the standards unless specified otherwise.

20.5 Matters may be dealt with in part by these specifications which are also dealt with, under the same or similar headings in cited standard. It is not intended that these specifications take the place of the standards but supplement them, unless specified otherwise.

20.6 Where reference is made to manufacturer's directions, instructions or specifications they shall include full information on storing, handling, preparing, mixing, installing, erecting, applying, or other matters concerning the materials pertinent to their use and their relationship to materials with which they are incorporated.

21 **FIRE RATINGS**

21.1 Where a material, component or assembly is required to be fire rated, the fire rating shall be as determined or listed by one of the following testing authorities acceptable to the authorities having jurisdiction:

.1 Underwriters' Laboratories of Canada.

.2 Underwriters' Laboratories Inc.

.3 Factory Mutual Laboratories.

.4 The National Research Council of Canada.

.5 The National Board of Fire Underwriters.

.6 Intertek Testing Services.

21.2 Where reference is made to only one testing authority an equivalent fire rating as determined or listed by another of the aforementioned testing authorities is acceptable if approved by authorities having jurisdiction. Obtain and submit such approval of authorities, in writing when requesting acceptance of a proposed equivalent rating or test design.

22 **QUALITY CONTROL**

22.1 Be responsible for inspection and testing as required by the Contract Documents, statutes, regulations, by-laws, standards or codes or any other jurisdictional authority. Give the Construction Manager and Consultant timely notice of the readiness for inspection, date and time for such inspection for attendance by the Construction Manager and Consultant.

22.2 Verify by certification that specified products meet the requirements of reference standards specified in the applicable specification sections.

22.3 Conduct testing, balancing and adjusting of equipment and systems specified in applicable mechanical and electrical specifications sections by independent testing company.

23 **INSPECTION AND TESTING BY THE CONSTRUCTION MANAGER**

23.1 The Construction Manager may appoint an independent inspection and testing company to carry out inspection and testing of the Work for conformance to the Contract Documents. Such costs for inspection and testing will be paid through the Construction Manager. However, any additional inspection and testing due to non-conformance to the Contract Documents shall be at the Trade Contractor's expense.

23.2 Coordinate inspections and testing with inspection and testing company. Inspections and testing will be promptly made. Uncover for examination any Work covered up prior to inspection or without approval of the Construction Manager. Make good such Work at no cost to the Owner.

23.3 The Inspection and Testing Company may inspect and test Products during manufacture, fabrication, shop testing, installation, construction and testing phases of the Contract. The Consultant will ascertain the quantity and quality of testing to be performed. Inspection and testing may be performed at the place of manufacture/fabrication, storage, or at the Site as designated by the Consultant. Where inspection and testing is done either during manufacture, fabrication, or at Site, ensure that proper facilities and assistance are provided.

24 **INSPECTION AND TESTING**

24.1 Source and Field Quality Control specified in Other Sections:

.1 This Section includes requirements for performance of inspection and testing specified under Source Quality Control and Field Quality Control in other Sections of the specifications.

.2 Do not include in work of this Section responsibilities and procedures that relate solely to an inspection and testing company's functions that are specified in another Section which is paid through the Construction Manager. Such information is included in this Section for Trade Contractor's information only.

24.2 Do not limit responsibility for ensuring that products and execution of the work meet Contract requirements, and inspection and testing required to this end, to specified inspection and testing.

25 **QUALIFICATIONS OF INSPECTION AND TESTING COMPANIES**

25.1 Inspection and testing companies to be certified by the Standards Council of Canada.

25.2 Companies engaged for inspection and testing shall provide equipment, methods of recoding and evaluation, and knowledgeable personnel to conduct tests precisely as specified in reference standards.

25.3 If requested, submit affidavits and copies of certificates of calibration made by an accredited calibrator to verify that testing equipment was calibrated and its accuracy ensured within the previous twelve months.

26 **REFERENCE STANDARDS**

26.1 Perform inspection and testing in accordance with Standards quoted and as required by procedures described in specified reference standards that are applicable to the work being inspected and tested.

27 **RESPONSIBILITIES OF THE TRADE CONTRACTOR**

27.1 Be responsible for quality control methods and procedures to ensure performance of the work in accordance with the Contract Documents.

28 **RESPONSIBILITIES OF INSPECTION AND TESTING COMPANIES**

28.1 Determine from specifications and Drawings the extent of inspection and testing required for Work of the Contract. Trade Contractors shall notify Construction Manager of any omissions or discrepancies in the work inspected and/or tested.

28.2 Perform applicable inspection and testing described in the Specifications and as may be additionally directed.

28.3 Provide competent inspection and testing personnel when notified by the Trade Contractor that applicable work is proceeding. Inspection personnel shall cooperate with the Consultant, Construction Manager and Trade Contractor to expedite the Work.

28.4 Trade Contractors shall notify the Consultant and Construction Manager of deficiencies and irregularities in the Work immediately when they are observed in the course of inspection and testing.

28.5 Inspection and testing companies shall not perform or supervise any of the Trade Contractor's work, and shall not authorize:

.1 Performance of work that is not in strict accordance with the Contract Documents.

.2 Approval or acceptance of any part of the Work.

29 **INSPECTION AND TESTING PROCEDURES**

29.1 Perform specified inspection and testing only in accordance with specified reference standards, or as otherwise approved.

29.2 Observe and report on compliance of the Work to requirements of Contract Documents.

29.3 Ensure that inspectors are on site or at fabricator's operations for full duration of critical operations, and as otherwise required to determine that the Work is being performed in accordance with the contract Documents.

29.4 Identify samples and sources of materials.

29.5 Review and report on progress of the work. Report on count of units fabricated and inspected at fabricator's operations.

29.6 Observe and report on conditions of significance to work in progress at time of inspection or at fabricator's operations. Include where applicable and if critical to the work in progress:

.1 Time and date of inspection.

.2 Temperature of air, materials, and adjacent surfaces.

.3 Humidity of air, and moisture content of materials and adjacent materials.

.4 Presence of sunlight, wind, rain, snow and other weather conditions.

29.7 Include in reports all information critical to inspection and testing.

29.8 Ensure that only materials from the work and intended for use therein are tested.

29.9 Determine locations for work to be tested.

30 **MOCK UPS**

30.1 Where required by Contract Documents construct mock-ups of work on Site, in size and at location directed by Consultant.

30.2 Construct mock-ups prior to start of affected work. Allow sufficient time for Consultant’s review. Work affected by mock-ups may not commence prior to acceptance of mock-ups.

30.3 Construct mock-ups to include all related specified materials and workmanship. Make revisions as directed by Consultant, in accordance with the intent of the Contract Documents, until mock-ups are acceptable.

30.4 Mock-ups, reviewed and accepted by Consultant, shall become the standard of quality against which installed work will be measured.

30.5 Mock-ups, by prior arrangement, may be incorporated into finished work if approved by Consultant.

31 **DEFECTS**

31.1 Defective products, materials and workmanship found at any time prior to Contract Completion will be rejected regardless of previous inspections, testing, and reviews of the Work. Inspections, testing, and reviews shall not relieve the Trade Contractor from their responsibility, but are a precaution against oversight or error. Remove and replace defective and rejected products, materials, systems, and workmanship. Be responsible for delays and expenses caused by rejection.

32 **SPECIFIED PRODUCTS**

32.1 Work of this Contract is based on Products specified by:

.1 Manufacturer's catalogued trade names and/or;

.2 References to standards (i.e. CAN, CGSB, CSA, ASTM) or;

.3 Prescriptive Specifications or;

.4 Performance Specifications.

32.2 When one or more manufacturer's trade name is specified for a Product, any one of the specified Products will be acceptable. Products by other manufacturers are subject to the Construction Manager's acceptance as an equivalent substitution in accordance with the specified requirements of substitutions.

32.3 When more than one manufacturer's catalogued trade name Product is specified along with a referenced standard, any one of the specified Products will be acceptable on condition the Product complies with the referenced standard.

32.4 When a Product is specified by reference to a standard only, the Trade Contractor may select any Product that meets or exceeds the specified standard for the intended purpose. The onus shall be on the Trade Contractor to establish that such Products meet the reference standard requirements. Products exceeding minimum requirements established by reference standards will be accepted for the Work if such Products are compatible with the Work with which they are incorporated.

32.5 When a Product is specified by prescriptive or performance Specification, any Product meeting or exceeding the Specification will be accepted.

32.6 When a Product is specified by reference to a standard or by prescriptive or performance Specification, upon request of the Construction Manager, obtain from the manufacturer, an independent testing laboratory report showing that the Product meets or exceeds the specified requirements.

32.7 Unless otherwise indicated in the Specifications, maintain uniformity of manufacture for any particular or like item throughout the Work.

33 **SUBSTITUTIONS**

33.1 Requests for substitutions will not be accepted prior to the Notification of Award. Substitutions will be considered by the Construction Manager provided that:

.1 The proposed substitutions have been investigated and complete data are submitted in accordance with the Specifications.

.2 Data relating to changes in the Contract Schedule, if any, and relation to other Work have been submitted.

.3 Same warranty is given for the substitution as for the original Product specified.

.4 All claims are waived for additional costs related to the substitution which may subsequently arise.

.5 Installation of the accepted substitution is co-ordinated into the Work and that full responsibility is assumed when substitutions affect other work. Make any necessary changes required to complete the Work. Revisions to the drawings for incorporation of the substitutions shall be made by the Construction Manager and all costs associated with the revisions shall be borne by the Trade Contractor.

33.2 Substitutions to methods or process described in the Specifications or drawings, may be proposed for the consideration of the Construction Manager. Ensure that such substitutions are in accordance with the following requirements:

.1 Time spent by the Construction Manager and Consultant in evaluating the substitution shall not be the basis for a claim by the Trade Contractor for extensions to the Contract Time.

.2 Clearly indicate how the proposed substitutions would be advantageous to the Owner or in the opinion of the Trade Contractor would improve the operation of the installation.

.3 Be responsible for substitutions to methods or processes concerning such Work and ensure that the warranty covering all parts of the Work will not be affected.

.4 The cost of all changes in the work of Other Trade Contractors, necessitated by the substituted methods or processes, if accepted, is borne by the Trade Contractor.

.5 The substituted methods or processes fit into space allotted for the specified methods or processes. Revisions to the drawings for incorporation of the substitutions shall be made by the Consultant and all costs associated with the revisions shall be borne by the Trade Contractor.

33.3 Substitutions will not be considered if:

.1 They are indicated or implied on shop drawings or Product data without formal request.

.2 Acceptance will require substantial revision of the Specifications and Drawings.

33.4 Do not substitute Products or methods or processes into the Work unless such substitutions have been specifically approved for the Work by the Consultant.

33.5 Approved substituted Products shall be subject to the Construction Manager's and Consultant’s inspection and testing procedures. Approved substituted Products shall only be installed after receipt of the Consultant’s written approval.

33.6 The Contract Price will be adjusted accordingly to any and all credits arising from the substitutions mentioned above.

34 **APPROVAL OF PRODUCTS AND INSTALLATION METHODS**

34.1 Wherever in the Specifications it is specified that Products and installation methods shall meet approval of Authorities having Jurisdiction, underwriters, the Construction Manager, or others, such approval shall be in writing.

35 **AVAILABILITY**

35.1 If delays in supply of Products are foreseeable, notify the Construction Manager of such, in order that remedial action may be authorized in ample time to prevent delay in performance of Work.

35.2 In the event of failure to notify the Construction Manager at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Construction Manager reserves the right to direct the Trade Contractor to take the following measures at no increase in Contract Price:

.1 Substitute more readily available Products of similar or better quality and character, or

.2 Temporarily install another Product until such time as the specified Product becomes available, at which time the temporarily installed product shall be removed and the specified Product installed.

36 **TRADEMARKS AND LABELS**

36.1 Permanent labels, trademarks and nameplates on Products are not acceptable in the finished Work, except where required by authorities having jurisdiction, for operating instructions, or when located in service rooms.

36.2 Remove trademarks and labels by grinding, if necessary, painting out where the particular surface is being painted, or if on plated parts, replace with new plain plated or non-ferrous metal parts.

37 **DELIVERY, STORAGE, HANDLING AND PROTECTION**

37.1 Be responsible for handling and delivery of Products. Protect Products from damage during handling, storage and installation. Deliver store and handle items in accordance with manufacturer's instructions and as specified. Be responsible for all costs of delivery, loading and off-loading, and for transportation back to its origin for correction, if required, due to damage or defect. Reject materials and Products delivered to the Site which are damaged.

37.2 Manufacture, pack, ship, deliver, and handle Products so that no damage occurs to structural qualities and finish appearance, nor in any other way which is detrimental to their function and appearance.

37.3 Ensure that Products, while transported, are not exposed to an environment which would increase their moisture content beyond the maximum specified.

37.4 Organize delivery of materials, Products and equipment to, and removal of debris and equipment from, the site and surrounding property.

37.5 Schedule early delivery of Products to enable Work to be executed without delay. Before delivery, arrange for receiving at the Place of the Work.

37.6 Coordinate mechanical and electrical equipment and apparatus deliveries with the manufacturer’s and suppliers such that equipment and apparatus is delivered to the site when it is required, or so that it can be stored within the building and protected from the elements.

37.7 Shop assemble work for delivery to Site in size easily handled and to ensure passage through building openings.

37.8 Deliver packaged Products, in original unopened wrapping or containers, with manufacturer's seals and labels intact.

37.9 Label packaged products to describe contents, quantity, and other information as specified.

37.10 Labels attesting that materials conform to specified reference standards will be acceptable as verification that contents meet specified requirements. In the absence of labels, submit affidavits to validate conformance of Product to reference standards, as requested by the Construction Manager.

37.11 Label fire-rated Products to indicate Underwriters' Laboratories of Canada approval.

37.12 Handle and store materials and products in such a manner that no damage is caused to the materials and products, the Work, the Site and surrounding property.

37.13 Allocate an area within the limits of the Work acceptable to the Owner for storage of Products brought to the Site. Keep storage area tidy at all times and do not use other parts of he property for storage. Arrange and pay for off-site storage when required.

37.14 Locate products on Site in a manner to cause minimal interference with the Work.

37.15 Store Products off the ground, in a manner to prevent damage, adulteration, deterioration and soiling to the Products, other building components, assemblies, other products, the structure, the Site and surrounding property, and in accordance with manufacturer's instructions when applicable.

37.16 Store packaged or bundled Products in original and undamaged condition complete with written application instructions. Keep manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in the Work.

37.17 Store Products subject to damage from weather in weatherproof enclosures.

37.18 Store and handle flammable liquids and other hazardous materials in approved safety containers and as otherwise prescribed by safety authorities. Store no flammable liquids or other hazardous material in bulk within the Work.

37.19 Make good or replace damaged materials to the satisfaction of the Construction Manager.

37.20 Hazardous Materials Information:

.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 (MSDS) in accordance with jurisdictional authorities.

.2 Deliver copies of Material Safety Data Sheets (MSDS) to the Construction Manager on all Products intended for use in the Work and designated as a "controlled product."

38 MANUFACTURER'S INSTRUCTIONS

38.1 Unless otherwise indicated in the Specifications, fabricate, install, apply, connect, install, erect, use, clean, and condition Products in accordance with manufacturer's instructions except where more stringent requirements are specified. Do not rely on labels or enclosures provided with Products. Obtain written instructions directly from manufacturers.

38.2 Notify the Construction Manager in writing, of conflicts between the Specifications and manufacturer's instructions, so that the Construction Manager may establish the course of action. If requested, make a copy of those instructions available at the Site.

38.3 In cases of improper installation or erection of Products, due to failure in complying with these requirements, the Construction Manager may direct removal and re-installation at no increase in Contract Price.

39 WORKMANSHIP

39.1 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 required results.

39.2 Do not employ any unfit person or anyone unskilled in their required duties. The Construction Manager reserves the right to require the dismissal from the Place of the Work, workers deemed incompetent, careless, insubordinate or otherwise objectionable.

39.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Construction Manager, whose decision is final.

39.4 Give particular attention to finished dimensions and elevations of the Work. Make finished Work fit indicated spaces accurately. Make finished Work flush, plumb, true to lines and levels and accurate in all respects.

39.5 Ensure that integrity of fire separations is maintained where they are penetrated.

39.6 Keep surfaces, on which finished materials will be applied, free from grease, oil, and other contamination which would be detrimental in any way to the application of finish materials.

39.7 Enforce fire prevention methods at Site. Do not permit fires, open flame heating devices or accumulation or debris. Use flammable materials only if all safety precautions are taken. Provide and maintain in working order ULC labelled fire extinguishers of types suitable for fire hazard in each case, and locate them in prominent location and to approval of jurisdictional authorities.

39.8 Where flammable materials are being applied, ensure that adequate ventilation is provided, spark-proof equipment is used, and smoking and open flames are prohibited.

40 **DIMENSIONS**

40.1 Check all dimensions at the Site before fabrication and installation commences and report discrepancies to the Construction Manager.

40.2 Where dimensions are not available before fabrication commences, ensure that dimensions required are agreed upon between the parties concerned.

40.3 Prior to commencing work, ensure that clearances required by jurisdictional authorities can be maintained

40.4 Wall thicknesses and openings shown on the drawings may be nominal only; ascertain actual sizes at the Site.

40.5 Verify dimensions of shop fabricated portions of the Work at the Site before shop drawings and fabrications are commenced. The Owner will not accept claims for extra expense by reason of non-compliance with this requirement.

40.6 Fabricate and erect manufactured items, shop fabricated items, and items fabricated on or off site, to suit site dimensions and site conditions.

40.7 In areas where equipment is to be installed, check dimensional data on equipment to ensure that area and equipment dimensions are compatible with necessary access and clearance provided. Ensure that equipment supplied is dimensionally suitable for space provided.

40.8 Leave areas clear where space is indicated to be reserved for future equipment, including access to such future equipment.

40.9 Whether shown on the Drawings or not, leave adequate space and provision for servicing of equipment and removal and reinstallation of replaceable items such as motors, coils and tubes.

41 TOLERANCES FOR INSTALLATION OF WORK

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

41.2 Unless acceptable tolerances are otherwise specified in specification sections or are otherwise required for proper functioning of equipment, site services, and mechanical and electrical systems:

.1 "Plumb and level" shall mean plumb or level within 1 mm in 1 m.

.2 "Square" shall mean not in excess of 10 seconds lesser or greater than 90 degrees.

.3 "Straight" shall mean within 1 mm under a 1 m long straightedge.

.4 "Flush" shall mean within:
- .1 6 mm for exterior concrete, masonry, and paving materials.
- .2 1 mm for interior concrete, masonry, tile and similar surfaces.
- .3 0.5 mm for other interior surfaces.

41.3 Allowable tolerances shall not be cumulative.

42 EXPANSION, CONTRACTION, AND DEFLECTION

42.1 Conform to manufacturer’s recommended installation temperatures. If items, components, assemblies, systems, and finishes are installed at temperatures different from operation or service temperatures, make provisions for expansion and contraction in service as acceptable to manufacturer and Construction Manager. Repair all resulting damage should expansion provisions provide inadequate.

42.2 Make provisions for expansion and contraction due to temperature changes within components, Products and assemblies, and between adjacent components, Products and assemblies, and due to building movements including but not limited to creep, column shortening, deflection, sway and twist. Ensure provisions for expansion, contraction and building movements prevent damages from occurring to and within components, Products and assemblies.

42.3 Make adequate allowance at wall and partition heads for deflection of the structure above. Determine requirements from Construction Manager where additional information is required. Where partitions butt to underside of floor assembly, or structural framing, the clearance shall be based on the span of the members supporting the floor or structural framing. In making such allowance use methods which maintain the integrity of the wall or partition as a sound, and/or fire barrier.

42.4 Make provisions in pipes, plenums, ducts and vessels containing air and fluids as is necessary to prevent damage due to fluid and air induced pressure, surges and vibrations, to pipes, plenums, ducts and vessels and to adjacent components, assemblies and construction to which pipes, ducts, plenums and vessels are attached or pass through.

43 **DIELECTRIC SEPARATION**

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

44 **FASTENINGS**

44.1 Include in the work of each section necessary fastenings, anchors, inserts, attachment accessories, and adhesives. Where installation of devices is in work or other sections, deliver and locate devices in ample time for installation.

44.2 Do not install fibre, plastic or wood plugs or blocking for fastenings in masonry, concrete, or metal construction, unless specified or indicated on drawings.

44.3 Install work with fastenings or adhesives in sufficient quantity to ensure permanent secure anchorage of materials, construction, components and equipment under static conditions, and to resist building thermal movement, creep and vibration.

44.4 Provide metal fastenings and accessories in same material, texture, colour, sheen and finish as metal on which they occur, unless indicated otherwise.

44.5 Prevent electrolytic action between dissimilar metals and materials.

44.6 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior Work, and where attached to, or contained within, exterior walls and slabs, unless stainless steel or other material is specified. Leave steel anchors bare where cast in concrete.

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

44.8 Conceal fasteners where indicated. Keep exposed fastenings to a minimum, space evenly and in an organized symmetrical pattern.

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

45 **ADJUSTING**

45.1 Ensure that all components of assemblies fit snugly, accurately and in true planes, and that moving parts operate positively and freely, without binding and scraping.

45.2 Verify that work functions properly and adjust it accordingly to ensure satisfactory operation. Lubricate Products as recommended by manufacturer.

46 **LAYOUT AND SURVEY**

46.1 Existing grades, lines, and site conditions shown on drawings were taken from survey information established by persons engaged directly by the Owner. The accuracy of survey information is not the Construction Manager's responsibility. The Owner will establish location of property lines.

46.2 Be responsible for setting out the Work. Prior to setting out the Work, verify dimensions and elevations shown on the Contract Documents and report to the Construction Manager any unsatisfactory conditions that may adversely affect the proper completion of the Work.

46.3 Set up and maintain permanent reference points and be responsible for the accuracy of such reference points. Establish lines and levels required for the performance of the Work.

46.4 Accurately set out the Work from levels and lines. Where Work of this Contract is dependent upon grades and elevations of existing structures or facilities, such grades or elevations shall take precedence over those determined by reference to established elevations. Advise the Construction Manager of any discrepancies.

46.5 During any activity of the Work, layout and check all features, including but not limited to the following:

.1 Establish and maintain temporary bench marks set required to perform the Work.

.2 Provide general dimensions, lines and elevations required to perform the Work.

46.6 Examine, preserve and protect established bench marks. Re-established a lost or displaced bench mark by a Land Surveyor licensed to practice in the place of Work at no cost to the Owner. Accept responsibility for setting out the Work.

46.7 In the event of a discrepancy between the Owner and the Trade Contractor regarding horizontal and/or vertical alignment conditions, that are beyond allowable specified tolerance, the Owner may engage the services of an independent Land Surveyor. The surveyor shall investigate the disputed condition and the results of the independent investigation shall determine the bearer of costs for this service, being either the Owner or the Trade Contractor.

46.8 If the Trade Contractor is found to be in error, all costs incurred to correct the condition shall be assumed by the Trade Contractor.

47 **GARBAGE DISPOSAL AND CLEANUP**

47.1 No hazardous or contaminated waste material shall be placed in owner's or Construction Manager's waste containers and Trade Contractors shall make their own arrangements for the disposal off site of any such material resulting from performance of their work.

47.2 Trade Contractors shall remove all regular waste material and debris from their work areas and deposit in the waste containers at the end of each working day. Any clean up work not performed as requested will be carried out by the Construction Manager with all resultant costs being charged to the Trade Contractor.

48 **CLEANING**

48.1 Ensure that splatters, droppings, soil, labels, and debris are removed from surfaces to receive finishes, before they set up. Leave work and adjacent finished work in new condition.

48.2 Maintain premises "broom clean" during progress of the work.

48.3 Do not allow waste material and debris to accumulate in an unsightly or hazardous manner. Provide containers in which to collect waste material and debris.

48.4 Use cleaning materials recommended for the purpose by both the manufacturer of Products forming surfaces to be cleaned and cleaning material.

48.5 Conduct cleaning operation in compliance with the occupational health and safety regulations, with local ordinances and anti-pollution laws.

48.6 Remove grease, dust, dirt, stains, labels, fingerprints, oxidization, excess adhesive and other contaminates from interior and exterior surfaces including glass, plastic laminate, plastic and other Products. Clean lighting components including lighting reflectors, lenses and other lighting surfaces.

48.7 When the Work is substantially performed, remove surplus Products, tools, construction machinery and equipment not required for the performance of the remaining Work.

48.8 Leave Work in a broom clean condition before the inspection process commences.

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

48.10 Rake clean exterior grassed areas and planting beds.

48.11 Remove dust, dirt and other foreign materials from exposed surfaces.

48.12 Vacuum clean and dust building interiors, including grilles, louvres and screens.

48.13 Remove stains, spots, marks and dirt from decorative Work, electrical and mechanical fixtures, floors and walls.

49 DEMONSTRATION AND INSPECTION OF PRODUCTS AND SYSTEMS

49.1 Arrange for a demonstration of systems and operating Products upon the 100% completion of their installation and prior to certification for Substantial Performance.

49.2 Include in the arrangements for the attendance of the Construction Manager, Owner, jurisdictional authorities, and personnel assigned by the Owner for the operation of the systems and/or Products.

49.3 Demonstrations shall be conducted by the Subtrade responsible for the installation of the systems and/or Product, assisted by representatives of the manufacturer or supplier. All personnel conducting the demonstration shall be completely knowledgeable of all conditions of the operating, functioning and maintenance of the systems and/or Products.

49.4 Owner's representative will acknowledge the successful completion of each demonstration on a form provided by the Trade Contractor. The form shall be agreed to by the Owner, Construction Manager and Trade Contractor prior to demonstration and testing.

49.5 Submit copies of letters from manufacturers of Systems and/or Products before making application for certificate of Substantial Performance to verify that the Products has been installed and connected correctly, and that it is operating in a satisfactory manner. The certification shall be based upon inspection and testing of the Products by competent technical personnel. Include in letter of certification the names of personnel conducting the testing and inspection, the methods of inspection utilized, and the location in the building of the Products certified.

49.6 Following submission of letters of certification and their acceptance by the Owner, the owner shall have the right to use the Products on a trial basis and for instructing their personnel in its use.

50 FINAL INSPECTIONS AND CLOSE OUT

50.1 Submit proposed closeout procedures and schedule of inspection to Construction Manager for approval before final demonstrations and inspections commence.

50.2 Arrange for, conduct and document final demonstrations, inspections, close-out and take-over at completion of the Work to the satisfaction of the Construction Manager.

51 **OPERATION AND MAINTENANCE MANUALS**

51.1 Hand over to the Construction Manager four (4) copies of a comprehensive operations and maintenance manual and material suitable for the Owner's maintenance employees. Manuals shall cover all Products supplied and installed under the Contract.

51.2 Submit draft of the operation and maintenance manuals for the Construction Manager's review at least 15 days before testing systems and equipment. Incorporate alterations and additions, as found to be necessary during testing, and prepare the final version of the manual from the corrected draft.

51.3 Submit final version of operation and maintenance manuals prior to Contract Completion.

51.4 Testing of systems and equipment will not be deemed to be complete until the requisite number of copies of the final version of the manuals has been handed over to the Construction Manager.

51.5 If standard literature is incorporated into the operations and maintenance manual, any irrelevant information shall be deleted, or suitably noted.

51.6 The manuals shall have sufficient detail in order that the Owner can totally maintain the equipment without outside help.

51.7 Submit all material in English.

51.8 Format:

.1 Organize data in the form of an instructional manual.

.2 Binders: Commercial quality, 219 x 279 mm, maximum "D" ring size.

.3 When multiple binders are used, correlate data into related consistent groupings.

.4 Cover: Identify each binder with type or printed title "Contract Record Documents"; list title of Contract, identify subject matter of contents.

.5 Arrange content by systems or process flow, under Section numbers and sequence of Table of Contents.

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

.7 Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

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

.9 Digital (PDF) format.

51.9 Contents:

.1 Operation and maintenance manuals shall contain the following minimum information and data:

.1 Table of contents: Provide title of Contract; names, addresses, and telephone numbers of Construction Managers and Trade Contractor with name of responsible parties; schedule of Products and systems, indexed to content of the volume.

.2 For each Product or system: List names, addresses and telephone numbers of Subtrades, suppliers and serviced representatives, including local source of replacement supplies and parts including telephone numbers.

.3 Warranties: Warranties are between the Trade Contractor and Owner. Warranties shall include, as a minimum:

.1 Description of warranty coverage.

.2 Date warranty starts (being date of Contract Completion).

.3 Date warranty expires.

.4 Contact name, address and phone number (the Trade Contractor shall also be responsible for advising the Owner of changes in contact information during the warranty period).

.5 Equipment and components performance curves.

.6 Hydro certificates.

.4 Reports: For each Product or system provide the following:

.1 Manufacturer's certified reports .

.2 Factory test reports.

.3 Field testing reports.

.5 Details of design, construction and/or fabrication features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of the installation.

.6 Technical data, Product data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items and parts lists.

.7 Schematics, interconnection lists: Manuals shall be complete with schematic and wiring diagrams, wiring interconnection lists and diagrams fully cross referenced and coordinated, printed circuit board layouts including the component identification, component parts list with electronic substitution equivalent. Provide cross referenced components lists and sequence of operations.

.8 Trouble shooting and fault location guide: Instructions to facilitate quick return of malfunctioning equipment to operation.

.9 Routine servicing and preventative maintenance schedule for Products and/or estimated hours required for routine servicing and preventative maintenance tasks.

.10 List of recommended spare parts and recommended quantity of each item to be stocked based on spare part availability and re-order time.

.11 Complete set of reviewed shop drawings.

.12 Product data: Mark each sheet to clearly identify specific Products and component parts, and data applicable to installation; delete inapplicable information.

.13 Drawings: Supplement Product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams and as required in the Specifications.

.14 Typed text: As required to supplement Product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions and as required in the Specification.

51.10 Drawings

.1 Prepare all required drawings on CAD, using AutoCAD Version 2002 or higher.

.2 Prepare CAD drawings to meet the requirements of the Owners or Construction Manager's CAD Standards and Procedures.

.3 Supply and hand over to the Construction Manager, one original photographic reproduction, for each final drawing prepared under this Contract, including but not limited to circuit drawings, equipment layout drawings, and shop drawings.

.4 The final size of drawings shall be 560 mm x 860 mm. Half size reproductions (280 mm x 430 mm) shall also be provided.

.5 Prior to Contract Completion, supply and hand over to the Construction Manager, one complete set of CAD Drawing Files in Autocad format for each final drawing prepared under this Contract, including but not limited to circuit drawings, equipment layout drawings, and shop drawings.

52 **PROGRESS RECORDS**

52.1 Maintain on site, permanent written records of daily progress of the Work. Records shall be open to review by Consultant and Owner at all times.

52.2 Records shall show dates of commencement, progress and completion of various trades and items of work. Particulars pertaining to number of employees of various trades and type and quantity of equipment employed daily, temperature, protection methods and other such data shall be noted.

53 **RECORD DRAWINGS**

53.1 Authorized deviations from drawings shall be marked in red accurately on one set of drawing prints in a neat, legibly printed manner and shall be dated. Prior to final inspection, neatly transfer the recorded information to a second set of drawing prints of the most recent revision to the drawings and submit both sets to the Construction Manager.

53.2 Maintain record drawings up to date as Work progresses. Status of maintained record drawings may be considered as a condition for validation of applications for payment.

53.3 Identify each record drawing as "Contract Record Copy" and maintain the record drawings in good condition. Make record drawings available to the Construction Manager at all times.

53.4 Record drawings shall include accurate dimensioned record of deviations and changes in Work from drawings.

53.5 Record drawings shall be signed and dated by Trade Contractor.

53.6 Submit record drawing to Construction Manager for review and make corrections as directed by Construction Manager.

53.7 Record accurately all deviations in the Work.

53.8 Accurately record locations of concealed structure, mechanical and electrical services and similar Work not clearly in view, the location of which is required for maintenance, alteration Work and future additions. Do not conceal such Work until the location has been recorded.

53.9 Accurately record locations of equipment bases, anchors, concrete pads and roof curbs, sleeves, piping, conduits, ducts, maintenance holes and valves, etc. located either below, outside or within structure.

53.10 Where piping, conduits and ducts are underground, underfloor, embedded in concrete or otherwise in unaccessible locations, accurately record with respect to structure column lines or walls and elevations with respect to finished floor levels or grades referenced to the centre line of components.

53.11 Accurately record any components which will be in inaccessible locations for Construction Manager's review before the component is covered, or buried, or made inaccessible.

54 **DUST CONTROL**

54.1 Submit Dust Control Plan conforming to requirements of the City of Toronto’s Public Health Services.

54.2 Communicate Dust Control Plan procedures to all appropriate personnel on site and their head offices and due diligence measures to be maintained to control all fugitive emissions.

54.3 Dust protection:

.1 Perform dust control procedures in accordance with approved Dust Control Plan and work of this Section.

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

.3 Clean water to be applied to hard and soft surfaces and on open excavation faces on Site daily to eliminate dust.

.4 Roadways and sidewalks to be cleaned daily or as required.

.5 A designated truck loading area on granular material to be used to mitigate tracking of potentially contaminated soil and debris off Site. Contaminated loading points to be cleaned or re-established.

.6 Loaded vehicles leaving Site to be cleaned of loose soil and debris with power washing or alternative method.

.7 Trucks loaded with indigenous soil to be covered by tarps or attached screens.

END OF SECTION

PART 1 – GENERAL

1.1 OBJECTIVE

1. This project has been designed to achieve a Leadership in Energy and Environmental Design (LEED) 2009 Gold level certification. LEED is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings.

1.2 GENERAL REQUIREMENTS

1. Contractor is required to implement practices and procedures to meet project environmental and energy objectives established to achieve targeted LEED Gold certification.

2. Contractor shall ensure that requirements related to these goals, as defined in sections below and in related sections of contract documents, are implemented to fullest extent. Substitutions or other changes to work proposed by Contractor shall not be allowed if such changes compromise stated LEED Building criteria.

   a. Contractor must purchase and utilize LEED Canada Reference Guide for Green Building Design and Construction 2009 (available through CaGBC: http://www.cagbc.org/source/Orders/index.cfm?Section=Store).

3. Specific project objectives impacting different categories of work and activities are described in respective Sections of work throughout these specifications.

4. Preliminary LEED Checklist is included at end of this Section for information only. A change to LEED Checklist alone does not constitute a change order.

1.3 RELATED SECTIONS

1. Following Division 1 Sections, included herein, contain requirements relating to LEED certification and apply to all Sections of work:

   01 57 13 - Temporary Erosion and Sedimentation Control

   01 57 21 - Construction IAQ Management

   01 60 00 - Recycled and Regional Materials

   01 61 16 - Indoor Air Quality Requirements

   01 74 19 - Construction Waste Management

1.4 CREDITS ASSIGNED TO CONTRACTOR

1. Contractor shall assign personnel or retain an independent consultant to ensure that credits within Contractor's scope of responsibility are met.

2. Contractor is responsible for ensuring all equipment, materials, and processes are performed for all credits to be pursued in project, in accordance with LEED Canada and all drawings and specifications.

3. Contractor is assigned as the professional responsible for the following prerequisites and credits:

LEED Canada Credit ID	Description	Related Specification Section
SSp1	Construction Activity Pollution Prevention	01 57 13
MRc2	Construction Waste Management: Divert 75% from Landfill	01 74 19
MRc4	Recycled Content: 20% (post-consumer + ½ pre-consumer)	01 60 00
MRc5	Regional Materials: 30% Extracted and Manufactured Regionally	01 60 00
EQc3.1	Construction IAQ Management Plan: During Construction	01 57 21
EQc4.1	Low-Emitting Materials: Adhesives and Sealants	01 61 16
EQc4.2	Low-Emitting Materials: Paints and Coatings	01 61 16
EQc4.3	Low-Emitting Materials: Flooring Systems	01 61 16
EQc4.4	Low-Emitting Materials: Composite Wood	01 61 16

1.5 LEED BUILDING SUBMITTAL REQUIREMENTS

1. Submit LEED building certification items listed in each section. All submittals shall be in PDF or hardcopy format. (PDF is preferred.)

2. LEED submittal information shall be submitted to Consultant for review as part of shop drawing review process. Incomplete or inaccurate LEED submittals may be used as basis for Consultant's rejection of products or assemblies.

3. Signed and certified LEED Letter Templates and calculations, for all LEED Credits / Prerequisites for which Contractor is responsible, as defined in above Section.

(Completed LEED Letter Templates will be provided by LEED Consultant to Contractor for signature after all LEED Submittals have been reviewed.)

4. Product cut sheets for all materials that meet LEED Building Performance criteria identified in each specification section. Cut sheets shall be submitted with Contractor's stamp as confirmation that submitted products are products installed in project.

1.6 REFERENCES

1. LEED Canada Reference Guide for Green Building Design and Construction 2009

END OF SECTION

PART 1 – GENERAL

1.1 OBJECTIVE

1. This Section includes requirements for Erosion and Sedimentation Control (ESC) Management Plan, to prevent ESC problems due to construction process or external conditions, in order to reduce impact of sedimentation from site to local environment.

1.2 RELATED SECTIONS

1. All Sections of Specifications involving construction activities.
2. All Specifications provided by Civil Engineer related to Erosion and Sedimentation Control, including any ESC Plan drawings and details generated by Civil Engineer, and all Ontario Provincial Standards (OPSS or OPSD) referenced. Where conflict exists, information provided by Civil Engineer shall take precedent over this specification.
3. Section 01 35 15 – LEED Building Requirements.

1.3 PERFORMANCE REQUIREMENTS

1. The General Contractor shall implement and follow the Erosion and Sedimentation Control Plan as generated by the Civil Engineer.
2. The following objectives must be addressed by the erosion and sediment control measures, as required by LEED credit interpretation request (CIR) 889:
    1. Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including but not limited to stockpiling of topsoil for reuse.
    2. Prevent sedimentation of any affected stormwater conveyance systems or receiving streams.
    3. Prevent polluting the air with dust and particulate matter.
3. The following erosion & sediment control requirements must be met, and method of compliance confirmed and described to the LEED Consultant and Civil Engineer, in accordance with LEED CIR 889:
    1. Preserve vegetation and mark clearing limits.
    2. Establish and delineate construction access.
    3. Control flow rates.
    4. Install sediment controls.
    5. Stabilize soils.
    6. Protect slopes.
    7. Protect inlet drains.

8. Stabilize channels and outlets.
9. Control pollutants.
10. Control dewatering.
11. Maintain the Best Management Practices (BMPs).
12. Manage the erosion and sedimentation control plan.

4. Best management practices (BMPs) that may be employed in accordance with, or in addition to, the Civil Engineer's Erosion and Sediment Control Plan, in order to comply with LEED CIR 889, include, but are not limited to, the following:
    1. Phasing
    2. Seeding
    3. Mulching
    4. Grading
    5. Filter socks
    6. Stabilize site entrances
    7. Preservation of existing vegetation
5. The General Contractor shall follow and carry out all work related to the Inspection and Documentation and Submittals sections listed below in this specification to meet credit requirements

1.4 INSPECTION AND DOCUMENTATION

1. Contractor shall designate one individual on site as ESC Management Representative, and shall make provisions for inspections of erosion and sediment control measures for deficiencies.
2. Inspection shall be undertaken bi-weekly at a minimum, as well as during or immediately after any major rain or other inclement weather events.
3. Inspections shall include all erosion and sedimentation control measures outlined in ESC Plan.
4. Documentation of correction of all deficiencies from inspections must take place.
5. Documentation may be in form of Erosion and Sedimentation Control Inspection Form provided below, or an equivalent form developed by Contractor and approved by Owner and LEED consultant.
6. If an equivalent form is developed, this form must include at a minimum: project name, date and time, weather conditions, measures inspected, deficiencies noted and corrections needed, if any, and indication of where photographs were taken.

7. All documentation shall be accompanied by photographs, highlighting both adherence to plan, as well as deficiencies and subsequent correction.

8. Photographs must be date-stamped and shall cover full range of measures outlined in ESC Plan, at least 2 photographs for each measure and at least 6 photographs per submittal.

1.5 LEED BUILDING SUBMITTALS

1. *LEED Form A, Construction Activity Pollution Prevention* (or equivalent), and accompanying photographs shall be provided to Owner and LEED Consultant on a monthly basis.

1.6 REFERENCES

1. LEED Canada Reference Guide for Green Building Design and Construction 2009, pp 4 -10

2. OPSD-219.130 – Heavy Duty Silt Fence Barrier

END OF SECTION

PART 1 – GENERAL

1.1 RELATED SECTIONS

1. All Sections of Specifications involving construction activities apply to this section.

1.2 PERFORMANCE REQUIREMENTS

1. Contractor shall follow Construction Indoor Air Quality Management Plan as listed below and perform required inspection and documentation procedures to meet credit requirements.

1.3 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN

1. HVAC Protection
    1. HVAC equipment (including HRVs, ERVs, fan coil units, and/or heat pumps) stored or installed on site must be covered by plastic wrap to avoid contamination from dust and odours.
    2. HVAC equipment must be stored on sleepers / skids when not installed.
    3. HVAC equipment must not be run in areas of heavy construction.
    4. If HVAC equipment is run during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8, as determined by ASHRAE 52.2-1999, must be used to protect air intake openings.
    5. Both supply and return system openings in or adjacent to construction areas must be sealed with plastic. Duro Dyne® *Dyn-O-Wrap™* self adhering duct wrapping film, or an approved alternative, shall be used. Unless under special circumstances, generic plastic film shall not be considered adequate.
        1. Supply and return system openings shall remain protected for duration of construction activity, including application of finishes.
        2. If duct wrap is damaged (e.g. during drywall installation), it is responsibility of person who damaged it to repair it immediately.
    6. Return system ductwork must be isolated from surrounding environment as much as possible (e.g. all tiles in place for a ceiling plenum, duct leaks repaired) to prevent induction of pollutants.
    7. Mechanical room shall not be used to store construction waste materials.
    8. If excessive dust or debris is present on ductwork, ducts must be cleaned professionally following construction and prior to occupancy.
    9. In-suite fan coil units and/or heat pumps must be cleaned of dust and debris following construction and prior to occupancy.
2. Source Protection

1. Low emitting materials and low VOC products must be installed where specified. This may include, but is not necessarily limited to: low VOC adhesives, sealants, paints and coatings; low emitting carpets and flooring systems.

2. VOC emissions of products shall be reduced by covering or sealing containers when not in use.

3. Local exhaust of pollution sources (e.g. temporary fans to exhaust gas powered equipment or vehicles) must be in compliance with applicable regulations and directed well away from air intakes. Where not feasible, air should be recirculated locally through a portable air cleaner.

4. Idling of vehicles is prohibited where emissions could be drawn into occupied areas.

5. Equipment must be cycled off when not in use.

6. Switching equipment (e.g. generators, fork lifts, chainsaws, etc) from diesel or gas powered to cleaner power sources, such as bottled gas or electricity, should be considered where appropriate.

7. Smoking within building and within 7 meters of openings and air intakes is strictly prohibited.

3. Pathway Interruption

    1. Staged construction zones must be isolated from surrounding occupied areas through use of dust curtains, plastic barriers, or balancing air systems to create negative pressure in work zone or positive pressure in occupied zone.

    2. Drop sheets, dust curtains or plastic barriers shall be inspected regularly to ensure they are working properly for their intended purpose.

4. Housekeeping

    1. When stored on site, sheet metal, insulation, and other ventilation materials must be installed on sleepers / skids until immediately prior to installation to avoid moisture absorption and subsequent damage.

    2. Construction areas shall be swept regularly to prevent build up of dust, debris or construction-related garbage. Ensure all surfaces are generally kept clean.

    3. Designated garbage bins should be specified and removed as needed.

    4. Dust accumulation shall be suppressed with use of wetting agents or increased cleaning frequency where appropriate.

    5. Vacuuming with HEPA vacuum filters shall be conducted when appropriate.

    6. Any spills of hazardous or solvent containing products must be cleaned up as soon as possible.

5. Scheduling

    1. Insulation, drywall, and any other moisture absorptive interior finishes may not be installed until building envelope is sealed to prevent moisture damage.

    2. Overlap of construction activities and occupancy should be reduced where possible. Activities with very high pollution potential should be scheduled for off hours when feasible.

    3. All filtration media should be replaced immediately prior to occupancy and after construction. Filters must have a minimum MERV value of 13 for any fresh air handling units greater than 600 cfm, and should treat both return and outdoor air streams. Smaller AHUs shall have best filter available, minimum MERV11.

1.4 INSPECTION AND DOCUMENTATION

1. Contractor shall designate one individual on site as Construction IAQ Management Representative to undertake monthly inspections of building and HVAC systems for deficiencies that could adversely affect IAQ.

2. Documentation of correction of all deficiencies from inspections must take place.

3. Documentation may be in form of IAQ Management Inspection Form provided below, or an equivalent form developed by Contractor and approved by Owner and LEED consultant.

4. All documentation shall be accompanied by photographs, highlighting both adherence to plan, as well as deficiencies and subsequent correction. Photographs shall cover a range of measures outlined in CONSTRUCTION IAQ MANAGEMENT PLAN Section above. Photographs must be date-stamped and cover a range of measures outlined above, and at least 2 from each of 6 categories.

1.5 LEED BUILDING SUBMITTALS

1. Schedule and cutsheets of all filters identifying respective MERV values used during construction and at end of construction.

2. Letter verifying that any necessary corrections or mitigations resulting from inspections that could adversely affect IAQ have been completed.

3. *LEED Form E, Construction IAQ Management* (or equivalent), and accompanying photographs shall be provided to Owner and LEED Consultant on a monthly basis.

1.6 REFERENCES

1. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) IAQ Guideline for Occupied Buildings Under Construction, second edition, November 2007, Chapter 3.

2. LEED Canada Reference Guide for Green Building Design and Construction 2009, pp 488 - 495

3. ASHRAE 52.2-1999

4. US EPA "Compendium of Methods for Determination of Air Pollutants in Indoor Air" www.arb.ca.gov/research/indoor/methods.htm

END OF SECTION

PART 1 – GENERAL

1.1 OBJECTIVE

1. Building shall incorporate building products with a high percentage of recycled material, reducing negative environmental impacts resulting from extraction and processing of virgin materials.

2. Building shall incorporate building products extracted and manufactured regionally, supporting use of indigenous resources and reducing environmental impact resulting from transportation.

1.2 RELATED SECTIONS

1. Drawings and general provisions of contract, including General and Supplemental Conditions, and other Division 1 Specifications Sections apply to this Section.

2. Section 01 35 15 – LEED Building Requirements

1.3 SCOPE

1. Scope of materials applicable to this section are Divisions 2 through 10 inclusive, as defined by National Master Spec 1995.

2. Materials installed under Divisions 11 through 14 may be optionally used in calculations if advantageous to project.

3. Materials installed under Divisions 15 and 16 (as defined by NMS 1995) are excluded from scope of this requirement.

1.4 REQUIREMENTS

1. Contractor shall use material with recycled content such that the sum of post-consumer recycled content plus one-half of pre-consumer content constitutes at least **20%** of total value of materials in project, calculated by cost.

2. Value of recycled content portion of a material or furnishing shall be determined by dividing mass of recycled content in item by total mass of all material in item, then multiplying resulting percentage by total cost of item.

3. Contractor shall use a minimum of **30%** of building materials or products for which at least 80% of mass is:

    1. extracted within 800 km of manufacturing site, or within 2400 km of manufacturing site if shipped by water or rail, AND

    2. manufactured/processed within 800 km of project site.

1.5 REFERENCES

1. LEED Canada Reference Guide for Green Building Design and Construction 2009, pp 402 – 421

1.6 EXECUTION

1. Recycled Materials

    1. Definitions:

        1. Post-Consumer Recycled Content: Consumer waste that has become a raw material (feedstock) for another product. It originates from products that have served a useful purpose in the consumer market. Much of this feedstock comes from residential and commercial (office) recycling programs for aluminum, glass, plastic and paper. Other post-consumer feedstock is supplied by businesses that recycle construction and demolition debris. For LEED, the recycled content percentage by mass of a product or material is used for the credit calculations.

        2. Pre-Consumer Recycled Content (previously known as post-industrial recycled content): Material diverted from the waste stream during a manufacturing process (Source ISO 14021). Examples of materials that can be considered pre-consumer content include planer shavings, ply trim, sawdust, bagasse, sunflower seed hulls, walnut shells, culls, trimmed materials, print overruns, over-issue publications, and obsolete inventories. Excluded from this definition is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it. For example if a gypsum board manufacturer were to utilize damaged gypsum board or manufacturing fall-offs in their manufacturing process this is not recycled content but good business practice. For LEED, the recycled content percentage by mass of a product or material is used for the credit calculations.

    2. Products shall contain specified recycled content listed in the table below:

Material	**Minimum Post-Consumer Recycled Content**	**Target Pre-Consumer Recycled Content**
Concrete (% reduction in Portland cement)	0%	50%
Concrete Reinforcement (Rebar)	80%	20%
Concrete Block Masonry Units and Finish Masonry	40%	20%
Concrete Block Masonry Units and Finish Masonry (% reduction in Portland cement)	0%	25%

Material	Minimum Post-Consumer Recycled Content	Target Pre-Consumer Recycled Content
Structural Steel	25%	40%
Steel Deck, Roofing and Siding	20%	25%
Light Steel Framing (Steel Studs)	25%	40%
Hollow Metal Door and Frames	25%	40%
Composite Wood (MDF, Particle Board)	0%	60%
Batt Insulation	55%	15%
Mineral Wool Insulation	0%	75%
Gypsum	10%	80%
Ceramic Tile	0%	30%
Acoustical Ceiling Tile	5%	40%
Suspended Ceiling T-Grid (Steel)	0%	25%
Suspended Ceiling Grid (Aluminum)	90%	0%
Carpet	5%	30%

2. Regional Materials

    1. Definitions:

        1. Extraction Location: The location where the raw materials used to manufacture a product or material were mined, quarried, or extracted. These raw materials are then transported to the manufacturing location. For recycled content, the extraction location is the recycling facility.

        2. Manufacturing location: The last point of manufacturing or processing of a product or material. For concrete, the concrete mixing plant would be the

manufacturing location as this is where all the components (Portland cement, aggregate, SCMs) are assembled into the final product.

2. Products listed below shall be regionally sourced:

    1. Landscaping materials and growing medium for plantings
    2. Asphalt
    3. Concrete
    4. Granular material
    5. Concrete reinforcement (rebar)
    6. Concrete block masonry units
    7. Concrete pavers
    8. Finish masonry
    9. Structural steel
    10. Steel deck, roofing and siding
    11. Steel studs and framing
    12. Glass and glazing assemblies
    13. Fiberglass insulation
    14. Mineral wool insulation
    15. Gypsum
    16. Acoustic ceiling tile
    17. Carpet

1.7 SUBMITTALS

1. *LEED Form C - Recycled and Regional Materials* (included at end of this Section) must be completed by all division 2 to10 trades and suppliers for all products in order to indicate recycled and regional material content. This form must be supplied by Contractor within 2 weeks of commencement of work, and shall include:

    1. Cost breakdowns for materials included in work. A materials only cost (excluding labour) must be identified.
    2. Amount (% by weight) of post-consumer and/or pre-consumer (post-industrial) recycled content in supplied product(s).

3. Distance from project site to manufacturer (actual distance, not driving distance) in kilometers. Accompanying documentation should confirm manufacturer location.

4. Distance from manufacturer to extraction site. Accompanying documentation should confirm extraction site location.

5. Percentage of product assembly meeting stated criteria. (Must be at least 80% to qualify for regional materials credit.)

6. Mode of transportation (road/rail/ship) from extraction site to manufacturing site.

2. Published product literature or letter of certification (on manufacturer's letterhead) from product manufacturer, validating information provided in LEED Form C (except cost).

3. To document Supplementary Cementing Materials (SCMs) used as recycled content, a letter signed by concrete supplier / manufacturer or professional engineer must be submitted that certifies reduction in Portland cement from Base Mix to Actual SCM Mix (as a percentage). This can be provided as a total reduction in Portland cement for all concrete used on project.

4. Within one month of commencing construction, Contractor must submit to LEED Consultant a total budget cost (material and labour) broken down by division.

END OF SECTION

PART 1 – GENERAL

1.1 OBJECTIVE

1. Building shall incorporate building products with a high percentage of recycled material, reducing negative environmental impacts resulting from extraction and processing of virgin materials.

2. Building shall incorporate building products extracted and manufactured regionally, supporting use of indigenous resources and reducing environmental impact resulting from transportation.

1.2 RELATED SECTIONS

1. Drawings and general provisions of contract, including General and Supplemental Conditions, and other Division 1 Specifications Sections apply to this Section.

1.3 SCOPE

1. Scope of materials applicable to this section are Divisions 2 through 10 inclusive, as defined by National Master Spec 1995.

2. Materials installed under Divisions 11 through 14 may be optionally used in calculations if advantageous to project.

3. Materials installed under Divisions 15 and 16 (as defined by NMS 1995) are excluded from scope of this requirement.

1.4 REQUIREMENTS

1. Contractor shall use material with recycled content such that the sum of post-consumer recycled content plus one-half of pre-consumer content constitutes at least **20%** of total value of materials in project, calculated by cost.

2. Value of recycled content portion of a material or furnishing shall be determined by dividing mass of recycled content in item by total mass of all material in item, then multiplying resulting percentage by total cost of item.

3. Contractor shall use a minimum of **30%** of building materials or products for which at least 80% of mass is:

    1. extracted within 800 km of manufacturing site, or within 2400 km of manufacturing site if shipped by water or rail, AND

    2. manufactured/processed within 800 km of project site.

1.5 REFERENCES

1. LEED Canada Reference Guide for Green Building Design and Construction 2009, pp 402 – 421

1.6 EXECUTION

1. Recycled Materials

    1. Definitions:

        1. Post-Consumer Recycled Content: Consumer waste that has become a raw material (feedstock) for another product. It originates from products that have served a useful purpose in the consumer market. Much of this feedstock comes from residential and commercial (office) recycling programs for aluminum, glass, plastic and paper. Other post-consumer feedstock is supplied by businesses that recycle construction and demolition debris. For TGS, the recycled content percentage by mass of a product or material is used for the credit calculations.

        2. Pre-Consumer Recycled Content (previously known as post-industrial recycled content): Material diverted from the waste stream during a manufacturing process (Source ISO 14021). Examples of materials that can be considered pre-consumer content include planer shavings, ply trim, sawdust, bagasse, sunflower seed hulls, walnut shells, culls, trimmed materials, print overruns, over-issue publications, and obsolete inventories. Excluded from this definition is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it. For example if a gypsum board manufacturer were to utilize damaged gypsum board or manufacturing fall-offs in their manufacturing process this is not recycled content but good business practice. For TGS, the recycled content percentage by mass of a product or material is used for the credit calculations.

    2. Products shall contain specified recycled content listed in the table below:

Material	**Minimum Post-Consumer Recycled Content**	**Target Pre-Consumer Recycled Content**
Concrete (% reduction in Portland cement)	0%	50%
Concrete Reinforcement (Rebar)	80%	20%
Concrete Block Masonry Units and Finish Masonry	40%	20%
Concrete Block Masonry Units and Finish Masonry (% reduction in Portland cement)	0%	25%

Material	Minimum Post-Consumer Recycled Content	Target Pre-Consumer Recycled Content
Structural Steel	25%	40%
Steel Deck, Roofing and Siding	20%	25%
Light Steel Framing (Steel Studs)	25%	40%
Hollow Metal Door and Frames	25%	40%
Composite Wood (MDF, Particle Board)	0%	60%
Batt Insulation	55%	15%
Mineral Wool Insulation	0%	75%
Gypsum	10%	80%
Ceramic Tile	0%	30%
Acoustical Ceiling Tile	5%	40%
Suspended Ceiling T-Grid (Steel)	0%	25%
Suspended Ceiling Grid (Aluminum)	90%	0%
Carpet	5%	30%

2. Regional Materials

    1. Definitions:

        1. Extraction Location: The location where the raw materials used to manufacture a product or material were mined, quarried, or extracted. These raw materials are then transported to the manufacturing location. For recycled content, the extraction location is the recycling facility.

        2. Manufacturing location: The last point of manufacturing or processing of a product or material. For concrete, the concrete mixing plant would be the

manufacturing location as this is where all the components (Portland cement, aggregate, SCMs) are assembled into the final product.

2. Products listed below shall be regionally sourced:

    1. Landscaping materials and growing medium for plantings
    2. Asphalt
    3. Concrete
    4. Granular material
    5. Concrete reinforcement (rebar)
    6. Concrete block masonry units
    7. Concrete pavers
    8. Finish masonry
    9. Structural steel
    10. Steel deck, roofing and siding
    11. Steel studs and framing
    12. Glass and glazing assemblies
    13. Fiberglass insulation
    14. Mineral wool insulation
    15. Gypsum
    16. Acoustic ceiling tile
    17. Carpet

1.7 SUBMITTALS

1. *LEED Form C - Recycled and Regional Materials* (included at end of this Section) must be completed by all division 2 to10 trades and suppliers for all products in order to indicate recycled and regional material content. This form must be supplied by Contractor within 2 weeks of commencement of work, and shall include:

    1. Cost breakdowns for materials included in work. A materials only cost (excluding labour) must be identified.
    2. Amount (% by weight) of post-consumer and/or pre-consumer (post-industrial) recycled content in supplied product(s).

3. Distance from project site to manufacturer (actual distance, not driving distance) in kilometers. Accompanying documentation should confirm manufacturer location.

4. Distance from manufacturer to extraction site. Accompanying documentation should confirm extraction site location.

5. Percentage of product assembly meeting stated criteria. (Must be at least 80% to qualify for regional materials credit.)

6. Mode of transportation (road/rail/ship) from extraction site to manufacturing site.

2. Published product literature or letter of certification (on manufacturer's letterhead) from product manufacturer, validating information provided in LEED Form C (except cost).

3. To document Supplementary Cementing Materials (SCMs) used as recycled content, a letter signed by concrete supplier / manufacturer or professional engineer must be submitted that certifies reduction in Portland cement from Base Mix to Actual SCM Mix (as a percentage). This can be provided as a total reduction in Portland cement for all concrete used on project.

4. Within one month of commencing construction, Contractor must submit to LEED Consultant a total budget cost (material and labour) broken down by division.

END OF SECTION

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

1. This Section includes requirements for volatile organic compound (VOC) content in adhesives and sealants (EQc4.1), paints and coatings (EQc4.2), flooring systems (EQc4.3), and composite wood (EQc4.4). Criteria are included as part of LEED building requirements for project.

2. Substitutions, or other changes to work proposed by General Contractor, shall not be allowed if such changes compromise stated LEED criteria.

3. VOC limits are listed in *VOC LIMITS FOR ADHESIVE, SEALANTS, PAINTS, & COATINGS* attached at end of this section.

4. Exceeding VOC limit in any product would jeopardize the respective LEED credit.

1.2 RELATED SECTIONS

1. 01 35 15 – LEED Building Requirements

1.3 VOC REQUIREMENTS FOR ADHESIVES AND SEALANTS

1. Volatile organic compound (VOC) content of sealants, adhesives, and all related primers used in this project shall not exceed limits defined in Rule 1168 – “Adhesive and Sealant Applications” of South Coast Air Quality Management District (SCAQMD), of State of California, version in effect at date of application of building permit.

2. Volatile organic compound (VOC) content of aerosol adhesives must comply with Green Seal Standard for Commercial Adhesives GS-36, in effect at date of application of building permit.

1.4 VOC REQUIREMENTS FOR PAINTS & COATINGS

1. Paints and coatings used on interior of building (defined as inside of weatherproofing system and applied on-site) shall comply with following criteria:

    1. Architectural paints, coatings and primers applied to interior walls and ceilings: Do not exceed VOC content limits established in Green Seal Standard GS-11, Paints, version in effect at date of application of building permit.

    2. Anticorrosive and anti-rust paints applied to interior ferrous metal substrates: Do not exceed VOC content limits established in Green Seal Standard GC-03, Anti-Corrosive Paints, of version in effect at date of application of building permit.

    3. Clear wood finishes, floor coatings, stains and shellacs applied to interior elements: Do not exceed VOC content limits established in South Coast Air Quality Management District Rule 1113, Architectural Coatings, version in

effect at date of application of building permit.

4. Chemical Component Limitations - Aromatic Compounds: product must contain no more than 1.0% by weight of sum total of aromatic compounds. Testing for concentration of these compounds will be performed if they are determined to be present in product during a materials audit.

5. Chemical Component Limitations - Other Chemicals: manufacturer shall demonstrate that following chemical compounds are not used as ingredients in manufacture of product:

    1. Halomethanes: methylene chloride
    2. Chlorinated ethanes: 1,1,1-trichloroethane
    3. Aromatic solvents: benzene, toluene (methylbenzene), ethylbenzene
    4. Chlorinated ethylenes: vinyl chloride
    5. Polynuclear aromatics: naphthalene
    6. Chlorobenzenes: 1,2-dichlorobenzene
    7. Phthalate esters: di (2-ethylhexyl) phthalate, butyl benzyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate, diethyl phthalate, dimethyl phthalate
    8. Miscellaneous semi-volatile organics: isophorone
    9. Metals and their compounds: antimony, cadmium, hexavalent chromium, lead, mercury
    10. Preservatives (antifouling agents): formaldehyde
    11. Ketones: methyl ethyl ketone, methyl isobutyl ketone
    12. Miscellaneous volatile organics: acrolein, acrylonitrile

1.5 VOC REQUIREMENTS FOR FLOORING SYSTEMS

1. Carpet systems must meet or exceed requirements of Carpet and Rug Institute's Green Label Indoor Air Quality test Program as shown below:

    1. Maximum Emission Factor (mg/m < or = Jhr) for Carpets
    www.carpet-rug.com/drill_down_2.cfm?page=8&sub=6

Total Volatile Organic Compounds	*0.5*
4-PC (4-Phenylcyclohexene)	0.05
Formaldehyde	0.05
Styrene	0.4

    2. Maximum Emission Factor (mg/m < or = Jhr) for Cushions
    www.carpet-rug.com/drill_down_2.cfm?page=8&sub=7

Total Volatile Organic Compounds	*1.00*
4-PC (4-Phenylcyclohexene)	0.05
Formaldehyde	0.05
BHT (butylated hydroxytoluene)	0.40

    3. Maximum Emission Factor (mg/m < or = Jhr) for Adhesives
    www.carpet-rug.com/drill_down_2.cfm?page=8&sub=8

Total Volatile Organic Compounds	*10.00*

2-Ethyl-1-Hexanol	3.00
Formaldehyde	0.05

2. All carpet adhesives shall meet requirements of Section 1.3 (VOC Requirements for Adhesives and Sealants) above.

3. All hard surface flooring must meet one of two standards:

    1. FloorScore

    2. California Department of Public Health Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 004 Addenda.

4. Flooring products include, but are not limited to:

    1. Vinyl;

    2. Linoleum;

    3. Laminate flooring;

    4. Engineered wood flooring;

    5. Ceramic flooring;

    6. Rubber flooring; and

    7. Wall base.

5. All components of hard surface flooring systems, including but not limited to adhesives, sealants and backing, shall meet requirements of Section 1.3 (VOC Requirements for Adhesives and Sealants) above.

6. Concrete, wood, bamboo and cork floor finishes (sealers, stains and finishes) must meet requirements of South Coast Air Quality Management District Rule 1113, Architectural Coatings, version in effect at date of application of building permit.

7. Tile setting adhesives and grout must meet Rule 1168 – “Adhesive and Sealant Applications” of South Coast Air Quality Management District (SCAQMD), of State of California, version in effect at date of application of building permit.

1.6 REQUIREMENTS FOR COMPOSITE WOOD

1. Composite wood and agrifibre products installed within the building weatherproofing system must meet one of the following requirements:

    1. Contain only resins with no added formaldehyde (NAF).

    2. Compliant with Ultra Low Emission Formaldehyde (ULEF) requirements as

per California Air Resources Board (CARB).

1.7 SUBMITTALS

1. For each product, complete *LEED Form F – Low-VOC Materials*, provided at end of this section. Fill in all relevant sections related to VOC content, Carpet and Rug Institute Green Label certification or flooring standard certification as applicable. State actual VOC content of each product used. Attach cut sheets, Material Safety Data sheets (MSDS), signed attestations or other official literature from manufacturers to this form.

    1. For adhesives, sealants, paints and coatings, provide cut sheets, Material Safety Data sheets (MSDS), signed attestations or other official literature from manufacturers clearly identifying VOC content in grams per Litre (g/L). VOC content reported in % by weight is not acceptable.

    2. For flooring systems, provide documentation indicating product meets requirements of Carpet and Rug Institute's Green Label Indoor Air Quality test Program, or is Floor Score certified, or passes California Public Health standard testing, depending on product type.

2. For composite wood and agrifibre products complete *LEED Form G – NAF*, provided at the end of this section and provide supporting documentation (MSDS forms or other literature) to confirm that products contain no added formaldehyde (NAF) or are compliant with CARB ULEF requirements.

3. Provide one copy of submittals listed above for review by LEED Consultant at least two weeks prior to purchase. Trades and suppliers must provide this documentation to General Contractor prior to commencement of work.

1.8 REFERENCES

1. Rule 1168 – "Adhesive and Sealant Applications" South Coast Air Quality Management District (SCAQMD), State of California, www.aqmd.gov

2. Green Seal Standards: GS-11 – Architectural Paints and Coating; GS-36 – Aerosol and Commercial Adhesives; and GC-03 Anti-Corrosive Paints, www.greanseal.org

3. Rule 1113 – "Architectural Coatings" South Coast Air Quality Management District (SCAQMD), State of California, www.aqmd.gov

4. Carpet and Rug Institute Green Label Testing Program. www.carpet-rug.com/drill_down_2.cfm?page =8&sub=3&requesttimeout=350

5. Carpet and Rug Institute, www.carpet-rug.com

6. Floor Score Program, Resilient Flooring Covering Institute. www.rfci.com/index.php?option=com_content&view=article&id=80&itemid=79

7. California Air Resources Board, Composite Wood Products standards.

http://www.arb.ca.gov/toxics/compwood/naf_ulef/naf_ulef.htm

8. LEED Canada Reference Guide for Green Building Design and Construction 2009, pp 5

VOC LIMITS FOR ADHESIVE, SEALANTS, PAINTS, & COATINGS

EQc4.1 - Adhesives and Sealants	
Product Type	Max. VOC content g/L)
Adhesives and Adhesive Primers	
Architectural Applications	
Indoor Carpet Adhesives	50
Carpet Pad Adhesive	50
Wood Flooring Adhesive	100
Rubber Floor Adhesive	60
Subfloor Adhesive	50
Ceramic Tile Adhesives	65
VCT & Asphalt Tile Adhesive	50
Drywall & Panel Adhesives	50
Cove Base Adhesives	50
Multipurpose Construction Adhesives	70
Structural Glazing Adhesive	100
Substrate Specific Applications	
Metal to Metal	30
Plastic Foams	50
Porous Material (except wood)	50
Wood	30
Fiberglass	80
Sealant Primer	
Architectural – Nonporous	250
Architectural – Porous	775
Other	750
Specialty Applications	
PVC Welding	510
CPVC Welding	490
ABS Welding	325
Plastic Cement Welding	250
Adhesive Primer for Plastic	550
Contact Adhesive	80
Special Purpose Contact Adhesive	250
Structural Wood Member Adhesive	140
Sheet Applied Rubber Lining Operations	850
Top & Trim Adhesive	250
Sealants	
Architectural Sealant	250
Non-membrane Roof Sealant	300
Roadway Sealant	250
Single-Ply Roof Membrane Sealant	450
Other Sealant	420
General Purpose Mist Spray - (%)	65
General Purpose Web Spray - (%)	55
Special Purpose Aerosol adh. (all types) - (%)	70

EQc4.2 - Paints and Coatings	
Product Type	Max. VOC content g/L)
Paints and Primers	
Interior Flat Coating or Primer	50
Interior Non-Flat Coating or Primer	150
Anti-Corrosive/ Anti-Rust Paint	250
Other Architectural Coatings	
Clear Wood Finishes: Lacquer	550
Clear Wood Finishes: Sanding sealers	350
Clear Wood Finishes: Varnish	350
Clear Brushing Lacquer	680
Floor Coatings	100
Sealers and Undercoaters	200
Shellac: Clear	730
Shellac: Pigmented	550
Stain	250
Concrete-Curing Compounds	350
Japans/Faux Fnishing Coatings	350
Magnesite Cement Coatings	450
Pigmented lacquer	550
Waterproofing Sealers	250
Waterproofing Concrete/Masonry Sealers	400
Wood Preservatives	350
Low-Solids Coatings	120

EQc4.3 - Tile setting adhesives	
Product Type	Max. VOC content (g/L)
Ceramic Tile Adhesive	65
Grout and mortar	250

Notes
Materials/products that are within building's weatherproofing layer must comply with given VOC limits.
*A coating is considered flat if it has a gloss of less than 5 on a 60-degree meter, or less than 15 on an 85-degree meter. If gloss is greater than these values, coating is considered non-flat. VOC limits for paints are based on no colour added at point-of-sale.

END OF SECTION

PART 1 – GENERAL

1.1 GENERAL

1. This Section includes requirements for Construction Waste Management (CWM), with criteria for recycling and/or salvaging demolition and construction waste generated during project.

1.2 RELATED SECTIONS

1. Drawings and general provisions of contract, including General and Supplemental Conditions and other Division 1 Specifications Sections apply to this Section.

2. All Sections of Specifications involving demolition or construction activities apply to this section.

1.3 PERFORMANCE REQUIREMENTS

1. CWM Plan shall be developed by Contractor or other qualified party as approved by Owner and Architect.

2. CWM Plan shall outline provisions to be implemented by Contractor to recycle and salvage demolition and construction waste generated during project. Upon approval of CWM Plan by Owner, it shall be implemented by Contractor throughout duration of project, and documented in accordance with Submittal Requirements.

3. End-of-project recycling rate shall equal, at minimum, **75%** (by weight) of total waste from demolition and construction. Excavated soil and land clearing debris are excluded from the calculation.

4. Goal of CWM Plan is to: 1) reduce waste generation; 2) reuse, salvage, or recycle waste materials; and 3) minimize waste disposal in landfills. Contractor shall ensure that requirements related to these goals, as defined in sections below, are implemented to fullest extent.

1.4 CONSTRUCTION WASTE MANAGEMENT PLAN

1. Construction Waste Management Plan shall include, but not be limited to, the following components:

    1. *Listing of Targeted Materials*: Contractor shall develop a list of waste materials from Project that will be targeted for reuse, salvage, or recycling. Following materials shall be accounted for (materials that will not be recycled shall be indicated as such):

        1. Cardboard, paper, packaging

        2. Clean dimensional wood, palette wood

        3. Concrete

        4. Concrete Masonry Units (CMU)

        5. Bricks

        6. Asphalt

        7. Metals from banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel,

stainless steel, aluminum, copper, zinc, lead, brass, and bronze.

8. Drywall

9. Carpet and pad

10. Paint

11. Asphalt roofing shingles, if applicable, for any existing building demolition

12. Rigid Foam

13. Glass

14. Plastics

2. *Landfill Information:* Contractor shall provide name of landfill(s) where garbage will be disposed of and applicable landfill tipping fee(s).

3. *Sorting Method:* Contractor shall provide description of proposed means of sorting and transporting recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from site for off-site sorting).

    1. For materials separated for recycling off-site, Contractor shall establish method for tracking weight of recycled material. Method shall be included in CWM Plan for Owner's and Architect's review and approval.

4. *Field Conditions:* Contractor shall include provisions in CWM Plan for addressing conditions in field that do not adhere to CWM Plan, including provisions to implement a stop work order, or to rectify non-compliant conditions.

5. *Additional Information:* Contractor shall include any additional information deemed relevant to describe scope and intent of CWM Plan to Owner and Architect.

1.5 LEED BUILDING SUBMITTALS

1. Contractor shall submit following LEED certification items:

    1. Copy of Construction Waste Management Plan, as defined above.

    2. Calculations and supporting documentation to demonstrate end-of-project recycling rates meet requirements for CWM Plan. Process for recording and assembling documentation shall be as follows:

        1. Record and document total weight (in tons) of all demolition and construction waste materials recycled, salvaged, or sent to landfill. Monthly Waste Management Reporting Forms shall be used as basis for determining total amount of waste recycled, salvaged, or sent to landfill for project. Monthly reporting forms shall specify:

            1. Number of dumpsters or other containers sent to recycling facility or landfill for that month;

            2. Volume (in cubic yards) of each dumpster or container sent to recycling facility or landfill for that month;

3. Type of waste contained in each dumpster or container; and

4. Weight of waste in each dumpster or container. If weight of waste is not directly measured for each dumpster or container, following Solid Waste Conversion Factors shall be used to convert volume of waste to weight:

   Solid Weight Conversion Factors:

   Mixed Waste 210 kg/m3

   Wood 180 kg/m3

   Cardboard 60 kg/m3

   Gypsum Wallboard 300 kg/m3

   Steel 600 kg/m3

   For materials not contained in Solid Waste Conversion Factors above (e.g. glass), Contractor shall propose a conversion factor for review by Owner and Architect.

5. Identification of recycling facility or landfill.

2. Calculate end-of-project recycling rate percentage by dividing recycled and salvaged waste (in tons) by total waste generated (recycled, salvaged, and landfilled waste – also in tons).

3. In addition, Contractor shall provide names of receiving facilities/companies that will be purchasing or accepting recycled or salvaged materials. Receipts or other proof of facility reception of materials are required.

1.6 REFERENCES

1. LEED Canada Reference Guide for Green Building Design and Construction 2009, pp 386 – 393

PART 2 – EXECUTION

2.1 IMPLEMENTATION

1. Contractor as applicable to relevant work divisions shall be responsible for implementation of CWM Plan, and for coordination of Plan with all affected trades. Contractor shall designate one individual as Construction Waste Management Representative, who will be responsible for communicating progress of Plan with Owner on a regular basis, and for assembling required LEED documentation.

2.2 MEETINGS

1. Contractor shall conduct Construction Waste Management meetings. Meetings shall include Subcontractors affected by CWM Plan. At a minimum, waste management goals and issues shall be discussed at following meetings:

   1. Pre-bid meeting.

   2. Pre-construction meeting.

   3. Regular job site meetings.

2.3 MONTHLY WASTE MANAGEMENT REPORTING FORMS

1. Monthly Waste Management Reporting Forms, as described in LEED BUILDING SUBMITTALS, shall be submitted to LEED Coordinator monthly for review throughout duration of project.

END OF SECTION

PART 1 – GENERAL

1.1 GENERAL

1. This Section includes requirements for Construction Waste Management (CWM), with criteria for recycling and/or salvaging demolition and construction waste generated during project.

1.2 RELATED SECTIONS

1. Drawings and general provisions of contract, including General and Supplemental Conditions and other Division 1 Specifications Sections apply to this Section.

2. All Sections of Specifications involving demolition or construction activities apply to this section.

1.3 PERFORMANCE REQUIREMENTS

1. CWM Plan shall be developed by Contractor or other qualified party as approved by Owner and Architect.

2. CWM Plan shall outline provisions to be implemented by Contractor to recycle and salvage demolition and construction waste generated during project. Upon approval of CWM Plan by Owner, it shall be implemented by Contractor throughout duration of project, and documented in accordance with Submittal Requirements.

3. End-of-project recycling rate shall equal, at minimum, **75%** (by weight) of total waste from demolition and construction. Excavated soil and land clearing debris are excluded from the calculation.

4. Goal of CWM Plan is to: 1) reduce waste generation; 2) reuse, salvage, or recycle waste materials; and 3) minimize waste disposal in landfills. Contractor shall ensure that requirements related to these goals, as defined in sections below, are implemented to fullest extent.

1.4 CONSTRUCTION WASTE MANAGEMENT PLAN

1. Construction Waste Management Plan shall include, but not be limited to, the following components:

    1. *Listing of Targeted Materials*: Contractor shall develop a list of waste materials from Project that will be targeted for reuse, salvage, or recycling. Following materials shall be accounted for (materials that will not be recycled shall be indicated as such):

        1. Cardboard, paper, packaging

        2. Clean dimensional wood, palette wood

        3. Concrete

        4. Concrete Masonry Units (CMU)

        5. Bricks

        6. Asphalt

        7. Metals from banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel,

stainless steel, aluminum, copper, zinc, lead, brass, and bronze.

8. Drywall

9. Carpet and pad

10. Paint

11. Asphalt roofing shingles, if applicable, for any existing building demolition

12. Rigid Foam

13. Glass

14. Plastics

2. *Landfill Information:* Contractor shall provide name of landfill(s) where garbage will be disposed of and applicable landfill tipping fee(s).

3. *Sorting Method:* Contractor shall provide description of proposed means of sorting and transporting recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from site for off-site sorting).

    1. For materials separated for recycling off-site, Contractor shall establish method for tracking weight of recycled material. Method shall be included in CWM Plan for Owner's and Architect's review and approval.

4. *Field Conditions:* Contractor shall include provisions in CWM Plan for addressing conditions in field that do not adhere to CWM Plan, including provisions to implement a stop work order, or to rectify non-compliant conditions.

5. *Additional Information:* Contractor shall include any additional information deemed relevant to describe scope and intent of CWM Plan to Owner and Architect.

1.5 TGS BUILDING SUBMITTALS

1. Contractor shall submit following TGS certification items:

    1. Copy of Construction Waste Management Plan, as defined above.

    2. Calculations and supporting documentation to demonstrate end-of-project recycling rates meet requirements for CWM Plan. Process for recording and assembling documentation shall be as follows:

        1. Record and document total weight (in tons) of all demolition and construction waste materials recycled, salvaged, or sent to landfill. Monthly Waste Management Reporting Forms shall be used as basis for determining total amount of waste recycled, salvaged, or sent to landfill for project. Monthly reporting forms shall specify:

            1. Number of dumpsters or other containers sent to recycling facility or landfill for that month;

            2. Volume (in cubic yards) of each dumpster or container sent to recycling facility or landfill for that month;

3. Type of waste contained in each dumpster or container; and

4. Weight of waste in each dumpster or container. If weight of waste is not directly measured for each dumpster or container, following Solid Waste Conversion Factors shall be used to convert volume of waste to weight:

   Solid Weight Conversion Factors:

   Mixed Waste 210 kg/m3

   Wood 180 kg/m3

   Cardboard 60 kg/m3

   Gypsum Wallboard 300 kg/m3

   Steel 600 kg/m3

   For materials not contained in Solid Waste Conversion Factors above (e.g. glass), Contractor shall propose a conversion factor for review by Owner and Architect.

5. Identification of recycling facility or landfill.

2. Calculate end-of-project recycling rate percentage by dividing recycled and salvaged waste (in tons) by total waste generated (recycled, salvaged, and landfilled waste – also in tons).

3. In addition, Contractor shall provide names of receiving facilities/companies that will be purchasing or accepting recycled or salvaged materials. Receipts or other proof of facility reception of materials are required.

1.6 REFERENCES

1. LEED Canada Reference Guide for Green Building Design and Construction 2009, pp 386 – 393

PART 2 – EXECUTION

2.1 IMPLEMENTATION

1. Contractor as applicable to relevant work divisions shall be responsible for implementation of CWM Plan, and for coordination of Plan with all affected trades. Contractor shall designate one individual as Construction Waste Management Representative, who will be responsible for communicating progress of Plan with Owner on a regular basis, and for assembling required TGS documentation.

2.2 MEETINGS

1. Contractor shall conduct Construction Waste Management meetings. Meetings shall include Subcontractors affected by CWM Plan. At a minimum, waste management goals and issues shall be discussed at following meetings:

   1. Pre-bid meeting.

   2. Pre-construction meeting.

   3. Regular job site meetings.

2.3 MONTHLY WASTE MANAGEMENT REPORTING FORMS

1. Monthly Waste Management Reporting Forms, as described in TGS BUILDING SUBMITTALS, shall be submitted to TGS Coordinator monthly for review throughout duration of project.

END OF SECTION

1 **GEOTECHNICAL INFORMATION**

1.1 A copy of the following detailed geotechnical information is appended to this Document:

.1 Report on Geotechnical Investigation
[...address...]
Toronto, Ontario
Prepared by:
Report No.:
Dated:

.2 Letter re:
Proposed ...
[... address...]
Toronto, Ontario
Prepared by:
Project No.:
Dated:

1.2 This geotechnical information records properties of subsurface conditions and recommendations for the design of foundations, pavements and soil remediation as outlined in the information provided.

1.3 The geotechnical information by its nature, cannot reveal all conditions that exist or can occur on the Site. Should subsurface conditions be found to vary substantially from the report, immediately notify Consultant in writing and await instructions.

1.4 Contractor shall not be entitled to extra payment or extension of Contract Time for work which is required and which is reasonably inferable in the geotechnical information as being necessary.

1.5 In case of discrepancies between recommendations contained in geotechnical information and requirements of Contract Documents, the latter shall govern. Advise Consultant in writing of any discrepancies discovered.

END OF DOCUMENT

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for the precast concrete stairs Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A123, Specification for Zinc (Hot Dip Galvanized) Coatings on Iron & Steel Products.

.2 ASTM A1064/A1064M, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.3 CAN/CSA-A23.1/A23.2, Concrete Materials & Methods of Concrete Construction / Methods of Test for Concrete.

.4 CSA A23.4, Precast Concrete - Materials and Construction.

.5 CAN/CSA G30.18-M, Billet-Steel Bars for Concrete Reinforcement.

.6 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steels (Metric Version).

.7 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.8 CSA W48, Carbon Steel Covered Electrodes for Shielded Metal Arc Welding.

.9 CSA W59, Welded Steel Construction (Metal Arc Welding).

.10 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 **DESIGN REQUIREMENTS**

.1 Design precast concrete stair elements, including anchors, connections and inserts, in accordance with CSA A23.4 and a minimum live load of 4.8 kN/m², dead load, lateral, and seismic loading, handling, transportation and erection loads, and imposed loads.

.2 Design members and their connections to withstand, within acceptable deflection limitations as specified that part of the total deflection occurring after attachment of nonstructural elements (sum of the long-time deflection due to all sustained loads and the immediate deflection due to any additional live load); span/480.

.3 Comply with the design and performance requirements of the building codes and as specified, follow profiles elevations and sizes shown on drawings, and design and engineer the work accordingly.

.4 Design precast elements to withstand gravity, temperature and shrinkage stresses, and can safely transmit horizontal and vertical loads through anchor points.

.5 Bearing areas to be reinforced against diagonal tension, splitting, rupturing and flexure. Place extra ties, stirrups and reinforcing bars at structural points. Do not allow bearing pressure to extend to edges of unreinforced sections.

.6 Supporting structure for precast stairs may deflect due to various loadings imposed on it both initially and over the long term. Typical calculated predictions of the movements of the structure due to deflection will be provided at locations of the connections, if required. The magnitude of the loads is based on the configuration of the precast concrete members shown and the design criteria of the applicable building code.

.7 Design anchor, reinforcing and other connection material required for the attachment of the precast stairs to the structure under this Section.

.8 Anchors and connections shall be structurally stressed to not more than 50% of the allowable stress when maximum load conditions are applied.

.9 Cast-in anchorages are part of the Work of this Section. Provide these elements to the site on schedule to be incorporated into the Work.

1.4 **SUBMITTALS**

.1 Shop drawings:
- .1 Submit shop drawings of precast elements in accordance with Section 10 10 10.
- .2 Submit shop drawings in accordance with CSA A23.4, including but not limited to the following:
  - .1 Location of each unit in the completed structure.
  - .2 Size and dimension of each stair.
  - .3 Anchors, inserts, and hardware setting / layout drawings.
  - .4 Tables and bending diagrams of reinforcing steel.
  - .5 Formwork, inserts, and associated reinforcement.
  - .6 Appurtenances for handling and erection.
  - .7 Concrete mix design.
  - .8 Concrete strength and admixtures.
  - .9 Connection details and erection procedure.

.2 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.

.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.5 QUALITY ASSURANCE

.1 Retain a Professional Engineer, licensed in the Province of Ontario and experience in precast concrete stair work of comparable complexity and scope, for the following services as part of the work of this Section:
- .1 Design precast stairs to accommodate live, dead, lateral, seismic, handling, transportation, erection and other loads.
- .2 Review, stamp, and sign fabrication and erection shop drawings, design calculations, and amendments thereto.

.2 Engineer designing precast stairs shall be insured against professional liability in accordance with section 74 subsection (1) of Regulation 941 of the Ontario Professional Engineers Act. The alternative of compliance with subsection (2) is not acceptable.

.3 Certification:
- .1 Manufacturer/erector: CSA certification under CSA A23.4 for Category SC products.
- .2 Prior to fabrication, submit certified copies of quality control tests as specified in CSA A23.4 for the following:
  - .1 Reinforcement, hardware, and connections.
  - .2 Concrete materials.
  - .3 Grout.
  - .4 Accessories.
- .3 Mill test reports for steel reinforcement verifying conformance with CAN/CSA-G40.20/G40.21-M.
- .4 Submit Product manufacturer's written certification that fabrication and erection of the precast structural concrete elements are in conformance with the Contract Documents.

.4 Welding: Both shop and in the field, shall conform to CSA Standards W59-M and W186-M. Any organization undertaking to weld shall be fully approved by the Canadian Welding Bureau under the requirements of CSA W47.1.

.5 Mock-Up:
- .1 Construct on Site a typical sample installation of one set of precast stair between floors in location designated by Consultant.
- .2 Adjust sample installation as required to gain acceptance. Accepted work may form part of final installation. Work shall match accepted installation.

1.6 **DELIVERY, STORAGE, AND HANDLING**

.1 Handle, transport, and store precast stairs as required by CSA A23.4 and by use of method, devised or approved, or both, by fabricator to prevent staining, soiling, and damage.

.2 Store precast stairs to clear ground or other bearing surfaces, to prevent overstress, warp, twist, accumulation of water and snow in depressions and holes, and to afford free movement of air on all sides of each unit.

.3 Deliver precast stairs to those who are responsible for installation to the place they direct, and to meet installation schedule.

2 Products

2.1 **MATERIALS**

.1 Formwork: CSA A23.4 .

.2 Steel for reinforcement, hardware, connections: CAN/CSA G30.18-M; Type 400W, billet steel bars, deformed.

.3 Welded steel wire fabric: ASTM A1064/A1064M for smooth wire fabric and deformed wire fabric, resistance welded in size and spacing shown.

.4 Inserts, anchorage plates, flush plates, and hardware: CAN/CSA G40.20/G40.21-M, Type 350W.

.5 Welding materials: CSA W48.

.6 Galvanizing: ASTM A 123; hot dipped galvanizing with minimum zinc coating of 610 g/m^2 .

.7 Touch-up primer: CAN/CGSB 1.181; zinc rich primer.

.8 Primer: CAN/CGSB-1.40-M.

.9 Cement, aggregates, water, admixtures: CSA A23.4 and CAN/CSA A23.1/23.2-M. Use same brands and source of cement and aggregate for entire project to ensure uniformity of coloration and other mix characteristics.

.10 Non-shrink grout: Pre-mixed, flowable, non-shrink grout without aggregate fillers; Masterflow 713 Plus by BASF Building Systems; Sika Grout 212 by Sika.

.11 Firestopping and smoke seals: In accordance with Section 07 85 00.

.12 Sealant: In accordance with Section 07 92 00.

2.2 FABRICATION

.1 Fabricate precast elements in accordance with CSA A23.4 and reviewed shop drawings.

.2 Mark each precast element, on a face which will be concealed in the final assembly, with the casting date and an identification code corresponding to the shop drawing layout, in order to facilitate element identification and erection.

.3 Fabricate and coordinate inserts, anchorage plates, flush plates, and hardware required to accommodate the Work. Supervise and verify insert layout during fabrication. Provide for items to be cast into concrete. Anchorage shall not interfere with reinforcement.

.4 Formwork:
1. Construct forms to maintain precast units within their specified tolerances.
2. Secure attached anchorage devices to formwork in locations not affecting position of main reinforcement or placing of concrete.

.5 Reinforcement: Reinforce work for in accordance with reviewed shop drawings. Weld reinforcement in accordance with CSA W186, finish with touch-up primer.

.6 Provide concrete cover in accordance with CSA A23.4 and jurisdictional authorities. Minimum coverage shall not be less than 19 mm.

.7 Concrete: Proportion normal density concrete in accordance with CAN/CSA A23.1/A23.2, to give following properties:
.1 Cement: use Type 10 Portland cement.
.2 Minimum compressive strength at 28 days: 35 MPa.

.8 Consolidate concrete through full cross-section of units to provide full bond with reinforcement. Surfaces shall be free of cold joints and honeycombing and with cambers incorporated.

.9 Finish treads of concrete stairs with non-slip finish. Treads to have raised non-slip continuous parallel ridges 50 mm wide near nosing. Raised portions to be 2.0 mm high, 2.0 mm wide and spaced 4.0 mm apart.

.10 Finish risers and underside of stairs smooth. Provide 10 mm chamfer at junction of tread and riser.

.11 Curing: Cure precast units in accordance with CSA A23.4, normal curing.

2.3 SOURCE QUALITY CONTROL

.1 Fabrication Tolerances: Dimensions of finished work shall be within the following tolerances:
.1 Width or thickness, plus or minus 3 mm.
.2 Length, plus or minus 6 mm.

.3 Units not out of square more than 3 mm in 2 m, or 6 mm in over 2 m.
.4 Inserts, bolts, holes, etc., plus or minus 6 mm.
.5 Warpage not to exceed span divided by 360.

.2 Inspection and Testing: Owner may engage an inspection and testing laboratory to test and report on materials and methods of fabrication of precast work.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Upon completion of precast structural concrete Work and prior to grouting or concealing of connections, submit a letter of inspection from the precast concrete supplier's engineer stating that precast concrete work has been manufactured and erected in accordance with the Contract Documents.

3.2 **ERECTION**

.1 Supply information required for installation of anchors, supports, inserts, and similar accessories that are required for work of this Section and are installed under work of other Sections. Assist or supervise, or both, in their installation.

.2 Erect precast elements in accordance with CSA A23.4. Erect units without damage to shape or finish. Replace damaged units.

.3 Fit and align precast concrete stairs straight, plumb, level, and square with uniform joint widths. Cumulative dimensional error in positioning precast units will not be allowed.

.4 Ensure that building structure is adequately shored and supported to withstand loading imposed by erection procedures. Provide temporary blocking and bridging during erection to prevent movement of units in place.

.5 Secure units in position by positive, mechanical connections in accordance with reviewed shop drawings and capable of maintaining loads which may be applied to the unit and allowing for structural deflections and building movements.

.6 Supply and install welded and bolted connections in accordance with the design requirements. Weld to steel structures in accordance with CSA W59. Touch-up weld damage to protective coatings with galvanized touch-up primer. Secure bolts with lockwashers.

.7 Provide required ULC/CSA approved grout/sealant to meet fire resistance ratings. Fill anchorage recesses and joints between precast stairs and adjoining construction with grout. Saturate surfaces of joints with water before grouting.

.8 Clean field welds with wire brush and touch-up galvanized zinc-rich primer.

.9 Do not install chipped, cracked, blemished, stained, or otherwise defective units.

.10 Precast scissor stairs require firestopping and smoke seals in accordance with Section 07 85 00.

.11 Seal joints between precast units and adjoining construction in accordance with Section 07 92 00.

3.3 **SITE TOLERANCES**

.1 Non-cumulative:
- .1 Joint dimension: nominal 9 mm; to vary not more than 6 mm to 12 mm.
- .2 Edge alignment and offset: not to exceed 3 mm.

3.4 **PATCHING**

.1 Repair damaged and defective precast stairs which have not been rejected by the Consultant. Submit to the Consultant for approval, the method and materials to be used for repair work.

.2 Finish patches to match precisely the colour and texture of adjacent area. Remove and repatch areas that do not match.

.3 Secure patch to concrete surfaces with a bonding agent in accordance with manufacturer's directions.

.4 Cut off lifting devices from precast units and patch recesses with grout.

.5 Patch damaged painted surfaces with rust inhibiting paint.

3.5 **CLEANING**

.1 Clean surfaces of work exposed to view after joint treatment is complete. Use fibre brushes, water, and mild cleaning agents only as recommended by precast fabricator. Remove deposits of foreign material, dirt, soil, and stains. Do not use tools which will damage finish surfaces. Rinse thoroughly with clean water after cleaning.

.2 Protect adjoining work from damage during cleaning.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for topping Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings indicating Sections, details, materials, dimensions, thicknesses of each layer, maximum and minimum thicknesses, 3, 7, and 28 day load characteristics, and surface finishes in accordance with Section 01 10 10.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certificates: Submit certification from manufacturer, stating that materials proposed for use are compatible with specified floor finishes.

1.4 **QUALITY ASSURANCE**

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator’s current certificate of approval by the material manufacturer as proof of compliance.

.2 Mock-up:
- .1 Construct one room mock-up of topping in location acceptable to Consultant.
- .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
- .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
- .4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

1.5 **SITE CONDITIONS**

.1 Do not install Work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
- .1 Concrete temperature: 10°C minimum.
- .2 Ambient air temperature: 16^0C to 30^0C
- .3 Precipitation: None.
- .4 Relative Humidity: If applicable.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 48 hours before, during, and 48 hours after installation.

2 Products

2.1 **MATERIALS**

.1 Concrete based levelling compound:
- .1 Compressive strength to ASTM C109, 28 day 4100 psi.
- .2 Flexural strength to ASTM C109: 28 day 1000 psi.
- .3 Primer: Type as recommended by topping manufacturer to suit intended condition.
- .4 Acceptable material: ‘Ardex K-15' by Ardex Engineered Cements or approved alternative.

.2 Water: potable.

2.2 **MIXES**

.1 Mix toppings in accordance with manufacturer's written instructions.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Where required or indicated by Consultant, scabble exposed surface of concrete subfloor to produce a sound surface in the present substrate.

.2 Remove loose, spalled, cracked, eroded and disintegrated concrete to solid surface.

.3 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance.

.4 Prohibit traffic on prepared areas until Work of this Section is completed.

.5 Supply and install temporary protection to adjacent surfaces, floor drains, and steel angles to prevent damage resulting from Work of this Section.

.6 Prior to application of topping, remove all debris by vacuuming.

3.3 **INSTALLATION**

.1 Install topping in accordance with reviewed shop drawings and manufacturer's written instructions.

.2 Levelling topping:
  .1 Install levelling material in accordance with manufacturer's instructions.
  .2 Let cure in accordance with manufacturer's, recommendations.

3.4 **PROTECTION**

.1 Provide temporary protection for surfaces subjected to concentrated loads before they have cured sufficiently to carry them without damage.

.2 Prevent traffic over completed areas, and protect Work of this Section from precipitation, freezing, and debris after final installation.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for masonry Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

.2 ASTM C207, Specification for Hydrated Lime for Masonry Purposes.

.3 ASTM C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

.4 CAN/CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction, Methods of Test and Standard Practices for Concrete.

.5 CAN/CSA A82, Fired Masonry Brick Made From Clay or Shale.

.6 CSA A165 Series, CSA Standards on Concrete Masonry Units.

.7 CSA A179, Mortar and Grout for Unit Masonry.

.8 CSA A370, Connectors for Masonry.

.9 CSA A371, Masonry Construction for Buildings.

.10 CAN/CSA A3000, Cementitious Materials Compendium.

.11 CSA G30.18, Carbon Steel Bars for Concrete Reinforcement.

.12 CSA S304.1, Design of Masonry Structures.

1.3 **SUBMITTALS**

.1 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating.
- .2 Wall sections and details, reinforcing and anchors, special detailing, patterning and locations of control joints.

.2 Samples:
- .1 Submit samples in accordance with Section 01 10 10:
- .2 Submit samples of each type and colour of masonry unit used prior to placing order.
- .3 Submit samples of coloured mortar to match masonry samples.
- .4 Submit samples of masonry anchors, and ties.

.5 Submit 250 x 200 mm samples of dampproof course and flashing.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Quality control submittals: Submit manufacturer's certificates stating that materials supplied are in accordance with this Specification.

1.4 QUALITY ASSURANCE

.1 Provide plain and reinforced masonry in accordance with CSA A370, CSA A371, and CSA S304.1.

.2 Cold Weather Protection:
- .1 To CAN/CSA-A371 and as follows:
  - .1 Maintain temperature of mortar between 5°C and 50°C until batch is used or becomes stable.
  - .2 Maintain ambient temperature of masonry work and it's constituent materials between 5°C and 50°C and protect site from windchill.
  - .3 Maintain temperature of masonry above 0°C for minimum of 3 days, after mortar is installed.
  - .4 Preheat unheated wall sections in enclosure for minimum 72 hours above 10°C, before applying mortar.
  - .5 Do not use scorched aggregate. Do not use salts or anti-freezes. Only use approved smokeless heaters.

.3 Hot Weather Requirements:
- .1 To CAN/CSA-A371 and as follows:
  - .1 Plan in advance for hot weather construction. Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
  - .2 Avoid using dry masonry in hot weather conditions. Use predampened masonry unit nominally saturated, but surface dry at time of laying. Do not dip masonry unit in bucket of water.
  - .3 Spread only enough mortar to permit soft setting of masonry units; do not over mix mortar materials; do not retemper mortar after 2 hours of use; do not retemper pigment coloured mortar; do not spread more than 900 mm (3') of mortar for placement of masonry unit.

.4 Mock-up:
- .1 Construct one mock-up panel of unit masonry construction, 1200 mm wide x 1200 mm high in a location accepted by Consultant.
- .2 Demonstrate use of reinforcement, ties, through-wall flashing, weep holes, jointing, coursing, coping and sills, mortar, bonding, control joints, and workmanship.
- .3 Mock-up may form part of Work if accepted by Consultant. Mock-ups which do not form part of Work are to be removed from Site during final cleanup, or when directed by Consultant.

1.5 **DELIVERY, STORAGE, AND HANDLING**

.1 Deliver, store and handle Products in accordance with the Conditions of the Contract and as specified herein.

.2 Remove unacceptable materials from Site and replace to acceptance of Consultant. Store materials off ground protected from wetting by rain, snow or ground water, or inter-mixture with earth or other materials. Store metal ties and reinforcement to prevent corrosion.

.3 Do not concentrate storage of materials on any part of structure beyond design load, take particular care not to overload unsupported portions of structure which may have not attained their full design strength.

.4 Comply with CSA A371. Do not use salt or calcium-chloride to remove ice from masonry surfaces.

.5 Deliver mortar materials in original unbroken and undamaged packages with the maker's name and brand distinctly marked thereon. Prevent damage to units.

.6 Keep masonry materials free from ice and frost. Keep units protected from concrete, mortar and other materials which could cause staining.

2 Products

2.1 **MASONRY UNITS**

.1 Burned clay brick: CAN/CSA A82, brick type as indicated on Exterior Finish Schedule.

.2 Concrete block units: Normalweight units, CSA A165 Series, thickness as indicated on Contract Drawing, classifications as follows:
- .1 H/15/A/M.
- .2 S/15/A/M.
- .3 Sc/15/A/M.

.3 Preformed stone sills and shapes: Manufactured stone, pressure formed and autoclaved, smooth finish, sizes as indicated. Stones as manufactured by Arriscraft International or approved alternative. Finish: Smooth unless otherwise indicated.

.4 Special shapes: Unless indicated otherwise, supply and install corner returns, bull-nosed or double bull-nosed units for exposed and external corners, bond beams, sash blocks for control joints, solid block where noted, concrete block lintels over openings in concrete block walls and any additional special shapes as indicated.

.5 Obtain each masonry unit type from same manufacturer. Supply and install units of uniform texture and colour for each kind required.

.6 Supply masonry units with exposed surfaces free of cracks, chips, blemishes, and broken corners.

2.2 **ACCESSORIES**

.1 Reinforcement: CSA A370, CSA A371, and ASTM A167, all components to be stainless steel, Type 304 unless otherwise specified , complete with separator or isolator to prevent galvanic reaction:

.1 This specification is based on products manufactured by Blok-Lok Limited. Products by Dur-O-Wal Ltd. and Fero Corporation are approved alternatives.

.2 Type 1 (single wythe): Truss type; ‘Blok-Trus BL30'.

.3 Type 2 (cavity wall block back-up): Adjustable truss type, fabricated from minimum 4.76 mm wire, complete with adjustable box anchor and insulation fasteners; ‘Adjustable Econo-Cavity Blok-Trus II BL37 System 2000' with ‘wedge-Lok Insulation Retainers’. Insulation retainer to straddle wire bridging the cavity.

.4 Type 3 (cavity wall stud back-up): Anchors fabricated from 1.5 mm plate with 4.76 mm wire, complete with screws; ‘Adjustable Veneer Anchors BL607' with ‘Flex-O-Lok tie’ and ‘Wedge-Lok’ insulation retainer. Insulation retainer to straddle anchor bridging the cavity.

.5 Connectors: CSA A370 and CSA S304.1.

.6 Reinforcing steel: CSA G30.18, Grade 400, refer to Contract Drawings for number, size, and location.

.2 Semi-rigid acoustic insulation board: ASTM C423; Semi-rigid inorganic fibres (either mineral or glass) with a thermosetting resin binder, unfaced, adhesive installation (no pin-clips), minimum density 48 kg/m3. Thickness: As indicated on drawings. Adhesive: Type as recommended by board manufacturer.

.1 'OEM Acoustical Board' by CertainTeed Corporation Canada.

.2 'SelectSound Acoustic Board' by Owens Corning Canada.

.3 Cavity wall insulation: In accordance with Section 07 21 00 .

.4 Sealant and sealant primer: ASTM C920, Type S, Grade NS; ‘Dow Corning 790' by Dow Corning Corporation or ‘Spectrem 3' by Tremco Limited complete with primer recommended by manufacturer.

.5 Loose steel lintels and lateral support angles: Supplied as part of Work of Division 5.

.6 Dampproof course and flashing: Reinforced SBS rubberized asphalt compound laminated to cross-laminated polyethylene film, 40 mils thick; 'Airshield Thru Wall Flashing' by W.R. Meadows or approved alternative, complete with primer and adhesive recommended by flashing manufacturer.

.7 Compressible filler: Paperless, semi-rigid, spun mineral fibre mats to accommodate gaps at top of masonry block walls sized at approximately 19 to 25 mm. Roxul AFB or approved alternative by CGC Inc. or Owens Corning Inc.

.8 Weep hole vents:
- .1 Flexible ultra-violet resistant polypropylene-copolymer plastic, ‘Cell-Vent’ by Blok-Lok, ‘Mortar Maze Cell Vents’ by Advanced Building Products Inc. or approved alternative.
- .2 Provide manufacturer recommended clear silicone adhesive for suspended applications.
- .3 Colour: To be selected by the Consultant.

2.3 MORTAR MATERIALS

.1 Loadbearing masonry: CSA A179, Type S, proportion method.

.2 Interior non-loadbearing masonry: CSA A179, Type N, proportion method.

.3 Exterior non-loadbearing masonry: CSA A179, Premixed 1-1-6 Type N, portland cement/lime, proportion method.

.4 Cement: CAN/CSA A3000, normal Portland.

.5 Masonry sand: CSA A179.

.6 Hydrated lime: ASTM C207, Type S.

.7 Water: Clean potable, free from deleterious elements and free from salts that can cause efflorescence.

.8 Mortar pigment: 'Bay Ferrox' by Bayer Inc. or approved alternative by Elementis Pigments. Colour to later selection by Consultant.

.9 Concrete fill and grout: 20 Mpa concrete in accordance with CAN/CSA A23.1/A23.2.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PROTECTION**

.1 Supply and install temporary waterproof, non-staining coverings, secured against displacement, to extend over walls and down sides to protect masonry Work from snow and wind driven rain, and from drying too quickly, until masonry Work is completed and protected by flashings or other permanent construction.

.2 Supply and install non-staining, protective coverings on horizontal and vertical surfaces to protect Work of this Section from damage, staining, marking, and mortar droppings.

3.3 **WORKMANSHIP**

.1 Perform masonry Work in accordance with CSA A371 and as indicated .

.2 Supply and install masonry Work plumb, level and true to line, with vertical joints in alignment and horizontal courses level, uniform, and straight.

3.4 **MASONRY - GENERAL INSTALLATION**

.1 Construct masonry work as required by jurisdictional authorities.

.2 Before commencing masonry work, verify required limitations for wall heights, wall thicknesses, openings, bond, anchorage, lateral support, and compressive strengths of masonry units and mortars.

.3 Construct masonry fire protection and fire separations of the thickness indicated on Drawings for the fire resistant ratings as noted on Drawings, and conforming to the Fire-Performance Ratings, Appendix ‘D’ to the National Building Code of Canada.

.4 Fire Separations and Fire Separations with Fire Resistance Ratings: Construct walls tightly to construction above and at perimeter, and without openings or voids. Do not reduce the thickness of walls to less than the thickness indicated on the Drawings or for the required fire resistance rating where required.

.5 Do not butter corner units, throw mortar droppings into joints, or excessively furrow bed joints. Do not shift or tap units after mortar has taken initial set. If adjustment is necessary after mortar has started to set, remove and replace with fresh mortar.

.6 Do not use admixtures without Consultant's written acceptance.

.7 Tool mortar joints slightly concave with non-staining tools unless indicated otherwise. Strike joints flush in non exposed areas or where shown on Contract Drawings. Use sufficient force to press mortar tight against masonry units on both sides of joints. Remove excess, remaining mortar material and burrs.

.8 Install masonry walls 25 mm clear of underside of steel building frames, roof or floor deck. Install masonry with a 19 mm space beneath shelf angles and install compressible filler.

.9 Cut masonry units with a wet saw to obtain straight, clean, even, unchipped edges. Cut units as required to fit adjoining work neatly or for flush mounted electrical outlets, grilles, pipes, conduit, leaving 3 mm maximum clearance. Use full-size units without cutting wherever possible.

.10 Reinforce veneer walls with adjustable wall reinforcing at maximum 400 mm o.c. vertically and 600 mm o.c. horizontally. Install reinforcing in accordance with manufacturer's instructions. In veneer walls extend reinforcement from support wall, spanning cavity into exterior wythe. Place at maximum 75 mm o.c. each way around perimeter of openings, within 300 mm of openings.

.11 Reinforce block walls with continuous wire reinforcement in every second block course. Supply and install prefabricated L and T sections. Cut, bend and lap reinforcing units as per manufacturer's printed directions for continuity at returns, offsets, pipe enclosures, and other special conditions. Bending of masonry reinforcement is not permitted.

.12 Reinforce masonry walls with reinforcing steel as indicated on Drawings. Vertical reinforcing shall be fully grouted in masonry cores with grout.

.13 At openings in block walls install extra reinforcement, so that first and second courses above and below openings are reinforced. Extend extra reinforcement 600 mm beyond opening in each direction.

.14 Reinforce joint corners and intersections with strap anchors 400 mm o.c.

.15 Do not place reinforcement across masonry wythes at control joints.

.16 Install masonry with 10 mm thick joints unless indicated otherwise. Make vertical and horizontal joints equal and of uniform thickness.

.17 Build control joints in masonry walls at intervals and in locations shown. Form joints for block walls using sash block units in accordance with details shown. Form joints for veneer walls by leaving head joints between stacked units void of mortar. Fill chase and joint with joint filler full height of control joints. Leave a depth of 13 mm for sealing unless otherwise shown.

.18 Install control joints in masonry walls where indicated on drawings and at projections and changes in direction. Where control joints have not been indicated provide joints at 6100 mm o.c. for exterior walls and 9150 mm o.c. for interior walls.

.19 If required, provide movement joints, similar to building control joints, installed between areas with different support conditions.

.20 Supply and install solid block or metal lath under block, and fill block cells solid for lintel bearing and as required to secure built-in anchor bolts and/or anchors shown.

.21 Do not tooth intersections of walls except as otherwise indicated.

.22 Install weep hole vents in accordance with manufacturer's directions, in exterior wythe of masonry above dampproof courses and flashings and at tops of walls using adhesive. Space weep hole vents maximum 600 mm o.c. horizontally. Prevent weep hole vents from becoming plugged with mortar or debris.

.23 Coordinate installation of masonry with installation of air barrier and vapour retarder to ensure continuity of these systems.

3.5 DAMPPROOF COURSES AND FLASHING

.1 Install dampproof courses beneath first masonry bearing course on slabs-on-grade. Trim dampproofing to conceal it.

.2 Install flashings in masonry in accordance with CSA A371.

.3 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings and elsewhere as indicated. Where flashings occur over openings in walls extend them past openings a minimum of 200 mm and turn up minimum 150 mm at each end to create a waterproof dam to prevent water draining into cavity.

.4 In veneer walls install flashings continuously from front edge of masonry, under outer wythe, turn up backing minimum 200 mm and provide watertight seal against support wall.

.5 Lap dampproofing and flashing 150 mm and seal in accordance with manufacturer's instructions.

.6 Before masonry work begins, place specified dampproofing under first course of masonry. Install continuous dampproofing with ends lapped and cut flush with exterior face of wall. Place similar dampproofing over top course.

3.6 MORTAR MIXING

.1 Thoroughly mix mortar ingredients in proper quantities needed for immediate use to requirements of CSA A179.

.2 Measure and batch mortar materials either by volume or weight, to accurately control and maintain proportions. Do not measure materials by shovel.

.3 Mix mortar with maximum amount of water consistent with workability for maximum tensile bond strength within capacity of mortar.

.4 Do not use mortar which has begun to set. Use mortar within 2 hours after initial mixing. Re-temper mortar during 2 hour period only as required to restore workability.

.5 Add mortar colour and admixtures to requirements of manufacturer's instructions.

.6 Provide uniformity of mix and colouration.

3.7 **BLOCK**

.1 Lay blocks in running bond except as indicated otherwise. Align block webs vertically and install thicker ends of face shells up.

.2 Install a full bed of mortar for first courses of masonry, for masonry units 100 mm thick and less, and between solid units. For remaining courses bed face shells, including vertical end joints, fully in mortar.

.3 Install special shaped and sized concrete block units as indicated and as required for a complete and coordinated assembly and to minimize cut units.

.4 Supply and install two courses of solid block beneath lintel bearing.

.5 Stagger end joints in every course. Align joints plumb over each other in every other course.

.6 Bond intersecting block walls in alternate courses. Where block work abuts concrete, anchor each block course to concrete.

3.8 **MASONRY VENEER**

.1 Prior to installation of masonry veneer, coordinate installation of air and vapour retarder with Section 07 26 00.

.2 Prior to installation of cavity insulation, examine air and vapour retarder and make good damage. Install cavity wall insulation in accordance with Section 07 21 00 .

.3 Lay masonry veneer in running bond, unless indicated otherwise, and in a full bed of mortar.

.4 Form angle corners with special shaped units; cutting of units is not permitted.

.5 Erect exterior cavity wall construction as shown on Contract Drawings.

.6 Install masonry veneer to prevent mortar droppings, debris and protrusions from impeding drainage and pressure equalization of rainscreen cavities and drained walls. Keep air space in cavity walls free from mortar droppings as much as possible. Place wood boards on ties or reinforcement and clean them of mortar droppings before laying next course of ties or reinforcement. Inspect cavity space for mortar droppings and ensure free drainage to weep holes.

.7 Apply sufficient mortar on end of stretchers to ensure end joints are compressed full when masonry unit is pressed into place.

3.9 **ACOUSTIC BOARD INSULATION**

.1 Prepare intended substrates and install acoustic board insulation with adhesive in accordance with manufacturer's recommendations.

.2 Carefully adjust acoustic boards horizontally and vertically to obtain tight joints between each board and around electrical service boxes, piping, air ducts and framing passing through.

.3 Apply and install insulation with adhesive in accordance with adhesive manufacturer’s written instructions.

.4 Butt joints tight. Pre-cut to fit openings, corners and projections prior to installation.

.5 Install precast shapes in full mortar bed and secure units to each other with stainless steel dowels and to masonry units with stainless steel hook anchors, fully grouted.

3.10 **SEALANT**

.1 Protect adjacent exposed surfaces to prevent smearing, staining or other damage, by masking or other means, prior to performing Work. Remove protection upon completion and clean adjacent, exposed surfaces of any compound deposited upon such surfaces.

.2 Prepare joints to receive sealants to manufacturer's instructions. Ensure that joints are clean and dry ferrous surfaces are free from rust and oil.

.3 Install joint backing. Apply bond breaker to back recess.

.4 Prime sides of recess, in accordance with sealant manufacturer's instructions.

.5 Apply sealant immediately after adjoining Work is in condition to receive such Work in accordance with manufacturer’s written instructions. Apply sealant in continuous bead using gun with correctly sized nozzle. Use sufficient pressure to evenly fill joint. Tool sealant to smooth surface, free from ridges, wrinkles, sags, air pockets, embedded impurities, dirt, stains or other defects.

3.11 **LINTELS**

.1 Install concrete block lintels over openings in masonry except where steel lintels are indicated.

.2 Set lintels with minimum of 200 mm uniformly distributed bearing at each end. Provide bond breaker under bearing ends.

.3 Install reinforcing steel and concrete fill in block lintels.

.4 Install loose steel lintels, as indicated in Contract Drawings. Centre over opening width.

3.12 **LATERAL SUPPORT ANGLES**

.1 Where non load bearing unit masonry partitions meet structural elements at top of partitions, provide lateral supports as required by the Ontario Building Code and in accordance with Structural details. In areas where ceilings are scheduled.

.2 Refer to structural drawings for staggering distance and sizes of lateral supports.

3.13 **BUILT-IN ITEMS**

.1 Coordinate and locate build-in items required to be built into masonry or supplied under Work of other Sections including hollow metal doors, windows, lintels, sleeves, inserts, etc. Build-in items to present a neat, rigid, true and plumb installation.

.2 Build wall openings, slots, and recesses required for ducts, grilles, pipes and other items.

.3 Coordinate installation of conduit, outlet boxes and other mechanical and electrical built-ins with Work of Divisions 21, 22, 23 and 26.

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

.5 Brace door jambs to maintain plumbness. Set anchors between metal frames and masonry and fill voids between hollow metal frames and masonry walls with mortar.

3.14 **INSTALLATION TOLERANCES**

.1 Install masonry Work to a plane flatness and exposed end tolerance of 3 mm in 3000 mm.

.2 Variation in Alignment from Unit to Adjacent Unit: 1.5 mm maximum.

.3 Plumb within 6 mm in 3 m, or in 6 mm in 6 m at external corners, expansion joints, or other conspicuous lines.

.4 Level within 6 mm in any bay or 6 m maximum distance, and 12 mm in 12 m or more.

.5 Located from position shown, and from related position of columns, walls, and partitions within 12 mm in any bay or 6 m maximum distance, and 19 mm in 12 m or more.

.6 Opening sizes within 6 mm of designated dimension.

.7 Column and wall cross-section dimensions within minus 6 mm and plus 12 mm.

.8 Joint widths to dimensions indicated or specified herein, but in no case greater than 12 mm. Variation of Mortar Joint Thickness: 1 mm every metre.

3.15 **REPAIR AND POINTING**

.1 Remove and replace masonry units which are loose, chipped, broken, cracked, marked, stained, discoloured, or otherwise damaged. Supply and install new units to match adjoining units and install in fresh mortar, and point to eliminate evidence of replacement.

.2 During tooling of joints, enlarge any cracks, holes, or other defects, point and completely fill with mortar.

.3 Point-up joints including corners, openings and adjacent Work for a neat, uniform appearance, properly prepared for application of sealant compounds.

3.16 **CLEANING**

.1 Obtain and follow unit masonry manufacturer's written instructions for cleaning of masonry.

.2 Clean exposed, masonry surfaces, removing excess mortar as work progresses. Allow mortar droppings to partially dry then dry brush with a stiff fibre brush.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for stone cladding Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium- Nickel Steel Plate, Sheet, and Strip.

.2 ASTM A276, Standard Specification for Stainless Steel Bars and Shapes.

.3 ASTM A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

.4 ASTM C920, Specification for Elastomeric Joint Sealants.

.5 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.6 CSA A371, Masonry Construction for Buildings.

.7 CAN/CSA A3000, Cementitious Materials Compendium.

.8 TTMAC, Terrazzo, Tile and Marble Association of Canada.

1.3 **DESIGN REQUIREMENTS**

.1 Design of anchoring system to withstand live, dead, lateral, wind, seismic, handling, transportation, and erection loads.

.2 Design connections, anchors and ties that are not fully detailed on Drawings. For components or connections that are fully detailed, accept responsibility for the successful fabrication and erection.

.3 Drawings are diagrammatic and do not intend to identify nor solve completely the problems of thermal or structural movement, fixings, anchorages and stability of stone cladding.

.4 Drawings indicate profile and configuration required together with relationship to structural building elements. Design anchoring system in such a manner that movement of the structure caused by live load, dead load and creep shall be accommodated by adequate `soft' joints in the system, and not transferred to overstress stone.

.5 Specifications are intended to give performance criteria data along with certain limiting factors specified herein and shown on Drawings, and include minimum requirements of stone assembly system without limiting the method of achieving such performance.

1.4 SUBMITTALS

.1 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Elevations, sections, details, materials, dimensions, gauges, finishes, site dimensions, and relationship to adjacent construction.
  - .2 Show details of anchorage system, complete with type, size, mass, gauge or diameter of anchors and supports, material identification and installation method for all anchors, fasteners, ties, cramps, dowels and supports.
  - .3 Each section of stone indicated on shop drawings must bear corresponding number marked on its back.

.2 Samples:
- .1 Submit following samples in accordance with Section 01 10 10:
  - .1 Submit samples of [each type of] stone unit for Consultant's approval.
  - .2 300 mm long samples of sealant proposed for use.
  - .3 Full size samples of anchors and ties proposed for use.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.5 QUALITY ASSURANCE

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature.

.2 Retain a Professional Engineer, licensed in Province of Ontario, with experience in Work of comparable complexity and scope, to perform following services as part of Work of this Section:
- .1 Design of stone anchoring system.
- .2 Review, stamp, and sign shop drawings and design calculations.

.3 Mock-up:
- .1 Construct one 10 m^2 mock-up of stone in location acceptable to Consultant. Mock-up shall include anchors, sealant, etc. to provide a complete assembly.
- .2 Sealant material within mock-up shall be reviewed separately for staining.
- .3 Arrange for Consultant's review and acceptance before proceeding with Work.
- .4 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
- .5 Upon final approval of Consultant, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

1.6 **DELIVERY, STORAGE, AND HANDLING**

.1 Carefully pack and load stone units for shipment using all reasonable and customary precautions against damage in transit. Avoid the use of blocking and packing materials which may cause staining or discolouration. Damaged or stained pieces will be rejected.

.2 Stack stone on timber spacers or platforms at least 100 mm above the ground, and exercise extreme care in preventing staining.

.3 Completely cover stone units in polyethylene or other suitable film, separating stone from wooden supports. Wrap stone so that water is shed from stockpile. Store stone vertically with weight on edge.

1.7 **SITE CONDITIONS**

.1 Do not install Work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
.1 Ambient air and surface temperature: 12^0C to 38^0C.
.2 Precipitation: None.

.2 Supply and install temporary protection and facilities to maintain specified environmental requirements for 72 hours before, during, and 72 hours after installation.

2 Products

2.1 **MATERIALS**

.1 Granite: ASTM C615, 40 mm thick Cambrian Black granite cladding in size finish as indicated on drawings. Provide samples for Consultant’s approval. Exposed edges shall have similar finish to exposed faces.

.2 Cement: CAN/CSA A3000, normal Portland, Type GU. Provide white cement where required for white or light coloured mortars.

.3 Aggregate: To CAN/CSA A23.1/A23.2-M.

.4 Water: Clean, potable and free of all deleterious and stain-producing substances.

.5 Stainless steel shapes, plates, channels, angles, and similar items: All items are to be Type 316 stainless steel conforming to ASTM A167 and ASTM A276 and complying with the requirements of Authorities having Jurisdiction.

.6 Cavity wall insulation: In accordance with Section 07 21 00.

.7 Epoxy stone joining adhesive: Two Component, UV stable, 100% solid epoxy adhesive designed to provide permanent, water resistant, non-yellowing bond.

.8 Sealant and sealant primer: ASTM C920, Type S, Grade NS; 'Dow Corning 790' by Dow Coring Corporation or 'Spectrem 3' by Tremco Limited complete with joint backing and primer recommended by manufacturer.

.9 Grout: Ultra/Color by Mapei Inc. or approved alternative. Grout colour: To be selected by the Consultant.

.10 Flashing: Reinforced SBS rubberized asphalt compound laminated to cross-laminated polyethylene film, 40 mils thick; 'Airshield Thru Wall Flashing' by W.R. Meadows or approved alternative, complete with primer and adhesive recommended by flashing manufacturer.

.11 Weep hole vents: Flexible ultra-violet resistant polypropylene-copolymer plastic, 'Cell-Vent' by Blok-Lok, 'Mortar Maze Cell Vents' by Advanced Building Products Inc. or approved alternative. Provide manufacturer recommended clear silicone adhesive for suspended applications.

2.2 **MIXES**

.1 Mix grout in accordance with TTMAC and manufacturer's written instructions.

2.3 **STONE FABRICATION**

.1 Verify dimensions of existing Work before commencing fabrications and report discrepancies to Consultant.

.2 Fabricate Work in accordance with reviewed shop drawings.

.3 Fabricate Work free from defects impairing function, appearance, strength and durability. Cut large sections of stone from the same block to ensure uniformity and continuity of the stone pattern.

.4 Cut stone accurately to shapes, dimensions and full to square with jointing as indicated. Dress exposed faces true. Fabricate stone units in sizes shown on reviewed shop drawings.

.5 Saw or cut beds and joints full square back from face at least two thirds of piece thickness. From that point bed may fall under square 38 mm in 300 mm maximum. Make bed joints free of large depressions.

.6 Saw or roughly dress backs of stone pieces to approximately true plane.

.7 Make exposed arises in true alignment and ease slightly to prevent snipping.

.8 Back-check stone contacting support system as indicated on reviewed shop drawings. Allow minimum of 19 mm clearance between back of stone and substrate. Shape beds of stone resting on support system to fit supports.

.9 Cut and drill stone for hangers, anchors, cramps, dowels and similar devices. Provide Lewis pin holes in pieces which cannot be manually handled. Do not cut holes in exposed surfaces.

.10 Clean sawn backs and beds of rust stains and iron particles.

.11 Finished surfaces of units as indicated on reviewed shop drawing and to match approved samples.

.12 Where Drawings indicate chamfers, reveals, cut-outs and other detail machined profiles and edge conditions, match surface finish of adjacent main surfaces for all such exposed locations.

.13 Outside corners shall be mitred with quirk joints.

2.4 **ANCHOR FABRICATION**

.1 Provide devices for anchoring the assemblies to support substrate with sufficient adjustment to permit correct and accurate alignment.

.2 Fabricate all anchoring devices required to secure the work of this Section. Supply anchors where required to be built into work of other Sections.

.3 Fabricate shelf angles, furring and support framing from steel sections to suit support substrate, and the general arrangement shown on the Drawings.

.4 Provide other members and reinforce the support systems as required to support the stone and meet the specified design requirements, in compliance with requirements of authorities having jurisdiction.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance.

.2 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from Work of this Section.

.3 Clean stone surfaces which are dirty or stained prior to setting. Clean stones by scrubbing with fiber brushes and drenching with clear water. Use only mild cleaning compounds that contain no acid, caustic or abrasives.

3.3 **INSTALLATION**

.1 Install stone in accordance with reviewed shop drawings and TTMAC level, plumb, square and true with uniform joints. Chipped, broken or blemished units will be rejected.

.2 Prior to installation of stone veneer, coordinate installation of air and vapour retarder with Section 07 26 00.

.3 Prior to installation of cavity insulation, examine air and vapour retarder and make good damage. Coordinate installation of cavity wall insulation with Section 07 21 00.

.4 Distribute stone units of ranging colour or texture evenly over the entire installation to avoid patches or streaks, to produce a homogeneous blending of all units. If an acceptable pattern or grain direction is apparent, due to natural appearance of stone, or finishing, install units so that pattern or grain is in one direction unless otherwise directed.

.5 Clean stone exposed surfaces by washing with stiff fibre brush and clean water. Drench dry stone with clean water just before setting.

.6 Supply inserts and anchorage devices for placing in and instruct other Sections as to proper location and position.

.7 Fasten the work securely as erection progresses. Provide all units with suitable temporary braces, shores and stays to hold them in position unit permanently secured. Draw all nuts and bolts tight and check bolt threads to prevent the nuts from backing off or spot weld nut heads.

.8 Install weep hole vents in accordance with manufacturer's directions. Space weep hole vents maximum 600 mm o.c. horizontally. Prevent weep hole vents from becoming plugged with mortar or debris.

.9 Attach anchors to back-up wall and to stone. Completely fill holes, slots and other sinkages for anchors with epoxy during setting of stone.

.10 Install anchors, dowels and cramps. Prior to setting stone over such items, fill drilled and machined holes with epoxy adhesive.

.11 Secure anchors, cramps, dowels, ties and other similar items. Space anchors at suitable centres and at not less than the minimum spacing allowed by authorities having jurisdiction. Individually support each stone unit.

.12 Securely anchor stone to support structure using adjustable, mechanical fastenings in accordance with reviewed shop drawings.

.13 Anchor supporting steel members to solid substrate backing in accordance with reviewed shop drawings. Do not use lead, aluminum or wood shims or wedges.

.14 Provide flush joints, within specified allowable tolerance, at surface between adjacent stone units for full length of joint.

.15 Accurately and neatly cut, drill and fit stone as required for outlets, fixtures, fittings, and other appurtenances abutting or extending through stone and repair all stone after other Sections have finished. Ensure that service outlets have been located in centre of stone units unless otherwise indicated on the Contract Drawings.

.16 Where service outlets have not been shown on the shop drawings, obtain detailed instructions as to location and layout from Consultant before cutting stone units.

.17 In cutting and fitting, the edges shall be carefully cut and ground to a perfect fit and all cutting shall be done in such a manner as not to impair the strength or appearance of the material.

.18 Drill holes for metal trimmings from physical templates of all items.

.19 Securely box and protect projecting corners, and other similar items liable to injury, with substantial wood boarding and plywood, placed and held in position.

3.4 **FLASHING**

.1 Install flashings in masonry in accordance with CSA A371.

.2 Install flashings under exterior stone bearing on foundation walls, slabs, shelf angles, and steel angles over openings and elsewhere as indicated. Where flashings occur over openings in walls extend them past openings a minimum of 200 mm and turn up minimum 150 mm at each end to create a waterproof dam to prevent water draining into cavity.

.3 Lap flashing 150 mm and seal in accordance with manufacturer's instructions.

3.5 **SEALANT**

.1 Protect adjacent exposed surfaces to prevent smearing, staining or other damage, by masking or other means, prior to performing Work. Remove protection upon completion and clean adjacent, exposed surfaces of any compound deposited upon such surfaces.

.2 Prepare joints to receive sealants to manufacturer's instructions. Ensure that joints are clean and dry ferrous surfaces are free from rust and oil.

.3 Install joint backing. Apply bond breaker to back recess.

.4 Prime sides of recess, in accordance with sealant manufacturer's instructions. All joints in stone must be primed prior to installation of sealant, unprimed stone joints will not be acceptable.

.5 Apply sealant immediately after adjoining Work is in condition to receive such Work in accordance with manufacturer's written instructions. Apply sealant in continuous bead using gun with correctly sized nozzle. Use sufficient pressure to evenly fill joint. Tool sealant to smooth surface, free from ridges, wrinkles, sags, air pockets, embedded impurities, dirt, stains or other defects.

3.6 **GROUTING**

.1 Remove dirt from joints by using pressure air stream.

.2 Apply grout in accordance with grout manufacturer's directions to produce watertight, filled joints without voids, cracks and excess grout.

.3 Except as otherwise indicated, rub and compress joints smooth with plastic tool to slightly concave joint.

.4 Finish grout flush to edge thickness of stone and remove excess grout with soft burlap or sponge moistened with clean water.

.5 Allow drainage under base course of stone.

3.7 **CLEANING**

.1 Wash stone surfaces with soft fibre brushes and a non-precipitating soapless cleaner and rinse with clean water.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for load-bearing metal studs Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A123, Specification for Zinc (Hot Dip Galvanized) Coatings on Iron & Steel Products.

.2 ASTM A653/A653 M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM C1002, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.4 CSA W47.1, Certification of Companies for Fusion Welding of Steel ~~Structures~~.

.5 CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.6 CSA W59, Welded Steel Construction (Metal Arc Welding) (Metric Version).

.7 CSA S136, Cold Formed Steel Structural Members.

.8 Canadian Sheet Steel Building Institute CSSBI 52M, Lightweight Steel Framing Binder.

1.3 **DESIGN REQUIREMENTS**

.1 Design load-bearing metal studs to withstand live, dead, lateral, wind, seismic, handling, transportation, and erection loads.

.2 Design load-bearing metal studs based on Limit States Design principles using factored loads and resistances. Loads and load factors to be in accordance with the National Building Code (NBC). Resistance factors to be determined in accordance with the NBC and CAN/CSA-S136-M.

.3 Design bridging to prevent member rotation and member translation perpendicular to the minor axis. Provide for secondary stress effects due to torsion between lines of bridging.

.4 Design load-bearing metal studs in accordance with following Climatic Design Data for Toronto contained in the Ontario Building Code:
   .1 Design temperature: January 1%, July 2 ½%.
   .2 Wind (Hourly wind pressures): 1 in 50 year occurrence.

.5 Design load-bearing metal studs for the full specified design wind load with the following deflection limits:
- .1 Brick and stone veneer: L/720.
- .2 EIFS system: L/600.
- .3 Metal siding and panels: L/360.

.6 Design load-bearing metal studs without relying on sheathing or gypsum board to resist torsion and weak axis buckling.

1.4 SUBMITTALS

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and system limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Wall construction, load-bearing metal stud wall system, design loads, member sizes, materials, component details, depth and gauge designation exclusive of coatings, location and spacings of framing members, connection and bracing details, bearing, anchorage, loadings, temporary bracing, welds, types and locations of mechanical fasteners, splices, permanent bracing, strapping and sheathing.
  - .2 Indicate locations, dimensions, openings and requirements of related work.
  - .3 Indicate welds by welding symbols as defined in CSA W59.
  - .4 Complete engineering design data to confirm that load-bearing metal studs meet design requirements specified.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certificates: Prior to commencement of work, submit 2 certified copies of load-bearing metal stud mill reports covering material properties.

1.5 **QUALITY ASSURANCE**

.1 Retain a Professional Engineer, licensed in Province of Ontario, with experience in Work of comparable complexity and scope, to perform following services as part of Work of this Section:
- .1 Design of load-bearing metal studs.
- .2 Review, stamp, date and sign shop drawings and design calculations.
- .3 Conduct shop and on-site inspections, prepare and submit written inspection reports verifying that this part of Work is in accordance with Contract Documents and reviewed shop drawings.

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

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Bailey Metal Products or Corus Metal Profiles.

2.2 **MATERIALS**

.1 General:
- .1 All materials under Work of this Section, including but not limited to, primers are to have low VOC content limits.
- .2 Wherever possible, metals used in work of this Section are to contain recycled content.

.2 Steel: to CSA S136, Grade A to D steel with Z275 zinc coating designation in accordance with ASTM A653/A653M.

.3 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

.4 Screws: pan head, self-drilling, self-tapping sheet metal screws, corrosion protected to minimum requirements of CSSBI, length to suit intended end use.

.5 Anchors: concrete expansion anchors or other suitable drilled type fasteners.

.6 Bolts, nuts, washers: hot dipped galvanized to ASTM A123, 600 g/m² zinc coating.

.7 Touch up primer: zinc rich, to CGSB 1-GP-181M.

.8 Acoustic insulation: In accordance with Section 09 21 16.

.9 Exterior sheathing: 15.9 mm thick, unless otherwise indicated, ‘Securock Glass-Mat Sheathing' by CGC Inc., ‘Dens-Glass Gold' by G-P Products or approved alternative.

.10 Sheathing screws: to ASTM C1002, Type S, corrosion resistant, 12.7 mm penetration into steel, complete with 38 mm diameter washers.

2.3 **METAL FRAMING**

.1 Metal studs: to CAN/CSA S136, fabricated from zinc coated steel, depth as indicated. Minimum steel thickness to be 0.91 mm.

.2 Stud tracks: fabricated from same material and finish as metal studs, depth to suit.
- .1 Bottom track: single piece.
- .2 Top track: two piece telescoping or single piece as required by design.

.3 Bridging: fabricated from same material and finish as studs, 38 x 12 x 1.22 mm minimum thickness.

.4 Angle clips: fabricated from same material and finish as studs, 38 x 38 mm x depth of metal stud, 1.22 mm minimum thickness.

.5 Tension straps and accessories: In accordance with reviewed shop drawings and as recommended by manufacturer.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Verify substrate surfaces are solid, free from surface water, frozen matter, and other foreign matter detrimental to performance. Ensure environmental and site conditions are suitable for installation of system.

3.3 **INSTALLATION**

.1 Install load-bearing metal studs in accordance with reviewed shop drawings and manufacturer's written instructions.

.2 Perform work in accordance with CSSBI 52M. Perform welding in accordance with CSA W59.

.3 Erect studs plumb, aligned and securely attached with 2 screws minimum at each point of attachment, or welded in accordance with manufacturer's recommendations. Anchor tracks securely to structure at 800 mm o.c. maximum, unless lesser spacing prescribed on shop drawings.

.4 For telescoping tracks install 50 mm minimum telescoping track at top of walls where required to accommodate vertical deflection. Nest top track into deflection channel a minimum of 30 mm and a maximum of 40 mm. Do not fasten tracks together. Stagger joints.

.5 Seat studs into bottom tracks and top track. Install studs at not more than 50 mm from abutting walls, openings, and each side of corners and terminations with dissimilar materials.

.6 Brace metal studs with horizontal internal bridging at spacing shown on reviewed shop drawings. Fasten bridging to steel clips fastened to metal studs with screws or by welding.

.7 Frame openings in stud walls to adequately carry loads by use of additional framing members and bracing as detailed on shop drawings.

.8 Cutouts: Limit distance from centerline of last unreinforced cutout to end of member to less than 300 mm.

.9 Touch up welds with coat of zinc rich primer.

.10 Erection Tolerances;
- .1 Plumb: not to exceed 1/500th of member length.
- .2 Camber: not to exceed 1/1000th of member length.
- .3 Spacing: not more than 3 mm from design spacing.
- .4 Gap between end of stud and track web: not more than 4 mm.

.11 Install acoustic insulation in accordance with Section 09 21 16.

3.4 SHEATHING INSTALLATION

.1 Install sheathing materials in accordance with manufacturer's written instructions.

.2 Install sheathing with long dimension perpendicular to metal studs, offset joints and butt tight, centre edges of sheathing over metal studs, mechanically fasten with specified fasteners and washers in accordance with manufacturer's instructions.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for the miscellaneous and metal fabrication Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A123, Specification for Zinc (Hot Dip Galvanized) Coatings on Iron & Steel Products.

.2 ASTM A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.3 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

.4 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

.5 ASTM B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.6 CISC/CPMA 1.73a, A Quick-Drying One-Coat Paint for Use on Structural Steel.

.7 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.

.8 CAN/CSA S16.1-M, Limit States Design of Steel Structures.

.9 CSA S136.1-M, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.

.10 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.11 CSA W48, Filler Metal and Allied Materials for Metal Arc Welding.

.12 CSA W59-M, Welded Steel Construction (Metal Arc Welding).

.13 CAN/CSA W117.2-M, Safety in Welding, Cutting and Allied Processes.

.14 CAN/CGSB 1.40-M, Primer, Structural Steel, Oil Alkyd Type.

.15 CGSB 85-GP-16M, Painting Galvanized Steel.

.16 Steel Structures Painting Council (SSPC), Steel Structures Painting Manual, Vol. 2.

1.3 **DESIGN REQUIREMENTS**

.1 Design details and connections, where not shown on Drawings, in accordance with CAN/CSA-S16.1 and CSA S136.1.

1.4 **SUBMITTALS**

.1 Shop drawings:
- .1 Submit shop drawings for fabrication and erection of miscellaneous and metal items in accordance with Section 01 10 10 indicating:
  - .1 Materials, core thicknesses, class of finish (AMP 555), connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
  - .2 Ensure shop drawings are of one uniform size and based on field measurements.
  - .3 Canopy support system.

.2 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.5 **QUALITY ASSURANCE**

.1 Retain a Professional Engineer, licensed in the Province of Ontario, with experience in Work of comparable complexity and scope, to perform the following services as part of the Work of this Section:
- .1 Design handrails and railings, canopy support system, and metal fabrication items that are required to resist live, dead, lateral, wind, or seismic loads.
- .2 Review, stamp, date and sign shop drawings.

.2 Execute welding by firms certified in accordance with CSA W47.1 Division 1 or 2.1. Ensure welding operators are licensed per CSA W47.1 for types of welding required by Work.

2 Products

2.1 **MATERIALS**

.1 General:
- .1 All materials under Work of this Section, including but not limited to, primers and paints are to have low VOC content limits.

.2 Wherever possible, metals used in work of this Section are to contain recycled content.

.3 Unless detailed or specified herein, standard products will be acceptable if construction details and installation meet intent of Drawings and Specifications.

.4 Include all materials, products, accessories, and supplementary parts necessary to complete assembly and installation of Work of this Section.

.5 Incorporate only metals that are free from defects which impair strength or durability, or which are visible. Install only new metals of best quality, and free from rust or waves and buckles, and that are clean, straight, and with sharp defined profiles.

.2 Structural shapes, plates, and similar items: CAN/CSA-G40.20/G40.21-M, Grade 350W. Hollow structural sections: CAN/CSA-G40.20/G40.21-M, Grade 350W, Class H.

.3 Galvanized sheet steel: ASTM A653/A653M Grade A, Z275 Commercial Quality zinc coating, size and shape as shown.

.4 Steel bar grating: Bearing bar sizes and spacing as indicated on drawings. Grating as manufactured by Borden Metal Products Ltd., Fisher & Ludlow Ltd. or McNichols Co.

.5 Welding materials: CSA W48 and CSA W59-M.

.6 Fasteners: Conforming to ASTM A307, Grade A, in areas not exposed to view, use unfinished bolts with hexagon heads and nuts. In areas exposed to view, use bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws and machine bolts Z275 zinc coated in accordance with ASTM A653/A653M. Supply bolts of lengths required to suit thickness of material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.

.7 Primer paint: CAN/CGSB-1.40-M or CPMA 1.73a.

.8 Galvanized primer paint: Inorganic zinc rich primer. For use on galvanized fabrications where touch up is to remain unpainted in finished work; Carbozinc 11WB by Carboline Company, Catha-Coat 305 by Devoe Coatings or Zinc Clad XI by Sherwin Williams.

.9 Drilled inserts: Mega by ITW Construction Products or HSL by Hilti Inc. heavy-duty anchors, sizes as shown.

2.2 FABRICATION

.1 Verify dimensions of existing Work before commencing fabrications and report any discrepancies to the Consultant.

.2 Fit and assemble Work in shop where possible. Execute Work in accordance with details and reviewed shop drawings.

.3 Use self-tapping shake-proof screws on items requiring assembly by screws or as indicated. Use screws for interior metal work. Use welded connections for exterior metal Work unless otherwise found acceptable by the Consultant.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush. Seal exterior steel fabrications against corrosion in accordance with CAN/CSA S16.1-M.

.5 Execute shop welding to requirements specified .

.6 Carefully make and fit details. Take special care with exposed finished Work to produce a neat and correct appearance to the Consultant's acceptance.

.7 Assemble members without twists or open joints.

.8 Correctly size holes for connecting Work of other trades where such can be determined prior to fabrication. Where possible, show holes on shop drawings. Place holes not to cause appreciable reduction in strength of member.

.9 Draw mechanical joints to hairline tightness and seal countersunk screw and access holes for locking screws with metal filler where these occur on exposed surfaces.

2.3 **FABRICATED ITEMS**

.1 Refer to Drawings for details of metal fabrication work and related items not specifically listed in this Section.

.2 Where work is required to be built into work of other Sections supply such members to respective Sections.

.3 Provide metal fabrication items indicated below and items not indicated to be supplied under other Sections. The following items includes miscellaneous and metal fabrication including but not limited to the items listed below.

.4 Handrails, guardrails, and posts:
- .1 Design railings to withstand minimum horizontal and vertical loads as required to meet requirements of authorities having jurisdiction. In no instance shall load design of railings be less than 2.2 kN/m horizontally and 1.5 kN/m vertically.
- .2 Close open ends of steel handrails with 1.9 mm thick closure neatly welded. Fabricate railings, handrails, guardrails and Schedule 40 pipe guards as shown on drawings.
- .3 Handrail bracket: Fabricate as shown. After fabrication, galvanized bracket in accordance with CAN/CSA G164-M.

.5 Lintels: Fabricated from CAN/CSA-G40.20/G40.21-M, Grade 350W, size and location as shown, width to be not less than 25 mm less than width of wall and extend 200 mm beyond opening at each end. Unless otherwise shown, fabricate lintels in block walls of steel sections. Provide neoprene acoustic isolation pad in accordance with acoustic isolation requirements.

.6 Masonry lateral support angles:
- .1 Supply only, to Section 04200 for installation, all horizontal lateral support anchors at top of non-load-bearing masonry walls.
- .2 Refer to Structural Drawings for size and spacing of required support anchors. Provide drilled holes as required for anchorage.
- .3 Galvanized for all exterior wall and unheated and high humidity locations.
- .4 Provide neoprene acoustic isolation pad in accordance with acoustic isolation requirements.

7. Shelf Angles: Of size indicated on Drawings and as specified in structural steel specifications, with adjustable inserts for vertical adjustment and slotted holes for horizontal; galvanized.

.8 Channel door frames: Structural channel sections, selected for trueness of web and flange, with joints welded and ground smooth. Supply bar stop and bent bar anchors for anchorage to masonry or concrete as required. Fit frames with temporary spreaders to prevent frame from springing out of shape.

.9 Support framing for canopies: Structural channel and angle framing continuously welded and securely anchored back to structure. Design framing and anchorage to support assembly dead loads and live loads, and lateral loads. Finish: Prime painted.

.10 Gratings:
- .1 Design and fabricate gratings for heavy traffic loading complete with tamper proof ‘hold downs’ in accordance with reviewed shop drawings and manufacturer’s written instructions.
- .2 Pressure lock bars to form rigid panels of required size. Band open ends of bars.
- .3 Make jointing in built-up sections with hairline joints in least conspicuous location. Assemble Work securely and reinforce where necessary with similar fastenings. Countersink screws unless otherwise noted. Grind exposed surfaces of rolled steel shapes or fill perfectly smooth.
- .4 Supply items that are required to be built into concrete and masonry.
- .5 Fabricate, finish and assemble items in shop where possible, consistent with size and shipping. Minimize field assembly.
- .6 Mitre cut metal mouldings for angles. Butt joints will not be accepted for these locations.
- .7 Provide grating access panels as indicated on drawings with heavy duty hinges, latched handle, and locking hasp.

.11 Drainage trench grating and frame:
- .1 Provide drainage trench grating and frame where indicated.

.2 Fabricate grating sections in maximum 914 mm widths. Edge band all sections. Ensure cross bars in adjoining sections are in alignment.

.3 Construct frames continuous steel angles with continuous steel bars at each side and ends of trench, with steel strap anchors at 600 mm o.c. welded on back for casting into concrete. Install angles with long leg vertical.

.4 Ensure that grating sections are placed in accurate position when casting frames into concrete. When placing sections for final installation, provide sufficient number of shims required to leave the grating sections level and flush with the finished floor surface. Secure each section with complete saddle clip assembly, including bolts, at maximum 600 mm o.c. Drill and tap supports to secure the clips.

.5 Galvanize gratings and frames after fabrication.

.12 Steel ladders: Fabricate complete with steel stiffeners, rungs, angle rails, bent plate straps or angle brackets as shown. Ladders in elevator pits shall extend 1220 mm high above finished floor. Provide safety cages around ladders where indicated on Drawings, in accordance with Ministry of Labour requirements.

.13 Ship Ladder:

.1 Materials: ASTM B221, Alloy 6063, Temper T-6, non-spark extruded aluminum and ASTM B209, Alloy 6063 Temper T-6 sheet aluminum.

.2 Aluminum Finish: Mill finish.

.3 Accommodation Height: As indicated on the Drawings.

.4 Angle of Inclination: As indicated on the Drawings.

.5 Treads: 152 mm wide by 45 mm deep by 610 mm long aluminum channel shaped section. Equally space treads. Connect treads to stringers with bolts to allow for future replacement.

.6 Tread Surface: Corrugated.

.7 Tread Surface: Abrasive filled.

.8 Stringers: 152 mm x 50 mm aluminum channel.

.9 Handrail: 32 mm diameter aluminum pipe.

.1 Form returns with 152 mm radius.

.2 Attach rail to stringer with pipe sections spaced at approximately 610 mm on center such that rail projects approximately 152 mm above stringer.

.3 Locate bottom of handrail 915 mm above finished floor.

.10 Acceptable product and manufacturer: ‘ACL-500 Series' by ACL Industries or approved alternative.

.14 Vanity counter supports:

.1 Provide triangular supports for vanity counters. Construct supports of 38 x 38 x 6 mm steel angles. Where indicated, conceal supports within cavity of drywall partition.

.2 Provide all drill holes required for concealed anchorage of counters and for anchoring to building structure.

.15 Miscellaneous steel brackets, supports and angles
- .1 Supply and install or supply for installation by trades responsible, all loose steel brackets, supports and angles where indicated, except where such brackets, supports and angles are specified under work of other Sections. Drill for countersunk screws, expansion anchors and anchor bolts.
- .2 Unless otherwise specified, prime paint for interior installation; galvanized finish for exterior installation.

2.4 ANCHORS AND FASTENING

.1 Use weld studs of size not larger than 10 mm for attaching miscellaneous materials and equipment to building steel. If weight of item requires larger fasteners use clips or brackets and secure by welding or through bolting.

.2 Use self drilling expansion type concrete anchors for attaching to masonry and concrete

.3 Do not secure items to steel deck.

.4 Use steel beam clamps of two bolt design to transmit load to beam web. Do not use C and I clamps.

2.5 WELDING

.1 Perform welding by electric arc process.

.2 Execute welding to avoid damage or distortion to Work. Execute welding in accordance with following standards:
- .1 CSA W48 - for Electrodes. If rods are used, only coated rods are allowed.
- .2 CSA W59-M and CSA W59S1-M for design of connections and workmanship.
- .3 CAN/CSA W117.2-M - for safety.

.3 Thoroughly clean welded joints and expose steel for a sufficient distance to perform welding operations. Finish welds smooth. Supply continuous and ground welds which will be exposed to view and finish paint.

.4 Test welds for conformance and remove Work not meeting specified standards and replace to Consultant's acceptance.

2.6 SHOP PAINTING

.1 Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.

.2 Shop prime steel with one coat of primer paint to dry film thickness of 0.07 mm. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 deg C. Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.

.3 Shop prime galvanized steel in accordance with CGSB 85-GP-16M.

.4 Clean but do not paint surfaces being welded in field.

.5 Do not paint surfaces embedded in concrete, but clean as if they were to be primed.

.6 Do not prime steel to be fireproofed or to receive intumescent paint coating.

.7 Do not prime machine finished surfaces, but apply an effective anti-rust compound.

.8 Take precautions to avoid damage to adjacent surfaces.

2.7 **HOT DIP GALVANIZING**

.1 After fabrication, hot dip galvanize specific miscellaneous steel items as indicated. After galvanizing, plug relief vents air tight with appropriate aluminum plugs as suitable and required for intended metal fabricated item. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with zinc rich primer in accordance with manufacturer's printed directions.

.2 Hot-dip galvanize members in accordance with requirements of the following ASTM, with minimum coating weights or thicknesses as follows:

.1 Rolled, pressed and forged steel shapes, plates, bars and strips: ASTM A123; average weight of zinc coating per square/metre of actual surface, for 4.8 mm and less thickness members 600 g/m^2 for 6 mm and heavier members 640 g/m^2.

.2 Iron and steel hardware: ASTM A153; minimum weight of zinc coating, in ounces per square foot of surface, in accordance with ASTM A153,Table 1 for the various classes of materials used in the Work.

3 Execution

3.1 **EXAMINATION**

.1 Examine previously installed Work, upon which this Section depends, verify dimensions and condition of existing Work, and coordinate repairs, alterations, and rectification if necessary. Commencement of Work of this Section is deemed to signify acceptance of existing, prior conditions.

.2 Obtain Consultant's written approval prior to field cutting or altering of structural members.

3.2 **ERECTION**

.1 Install metal fabrications in accordance with reviewed shop drawings and manufacturer's written instructions.

.2 Fit joints and intersecting members accurately. Make Work in true planes with adequate fastenings. Build and erect Work plumb, true, square, straight, level and accurate to sizes detailed, free from distortion or defects detrimental to appearance or performance.

.3 Perform drilling of concrete and steel as required to fasten Work of this Section.

.4 Erect rails and handrails in true vertical and horizontal planes, rigid, and free from whip.

.5 Continuously weld connections for railings.

3.3 **TOUCH UPS**

.1 Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up shop primer damaged during transit and installation, with primer to match shop primer.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for the glazed balcony railings and balcony dividers Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CAN/CGSB-12.1-M, Tempered or Laminated Safety Glass.

.2 CAN/CGSB-12.20-M, Structural Design of Glass for Buildings.

.3 CSA-S157-M, Strength Design in Aluminum.

.4 BS EN 14179-1, Glass in building. Heat-soaked thermally-toughened soda lime silicate safety glass. Definition and description.

1.3 **DESIGN REQUIREMENTS**

.1 Design glass balustrade and divider systems to CAN/CGSB-12.20-M and CSA-S157-M. Perform stress analysis. Design units to accommodate live, dead, lateral, wind, seismic, handling, transportation, and erection loads.

.2 Design glazed handrails to have protection rail along top edge consisting of either full top rail or 13 mm x depth of glass metal trim (aluminum or stainless steel) secured in place with silicone sealant. Refer to drawings.

.3 Design glazed balustrade system to utilize glass types indicated below:
- .1 Heat strengthening laminated glass; handrail glazing located beyond edge of balcony floor or within 50 mm of edge of balcony floor.
- .2 Heat soaked tempered glass or heat strengthened laminated glass; handrail glazing located 50 mm to 150 mm inward from edge of balcony floor.
- .3 Heat strengthening laminated glass, heat soaked tempered glass or standard tempered glass; handrail glazing located more than 150 mm inward from edge of balcony floor.

.4 Design glazing in accordance with City of Toronto Green Development Standard - Bird Friendly Development Guidelines.

1.4 **SUBMITTALS**

.1 Shop drawings:
- .1 Submit shop drawings for fabrication and installation of aluminum handrails in accordance with Section 01 10 10 indicating:
  - .1 Thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, details, and accessories.
  - .2 Ensure shop drawings are of one uniform size and based on field measurements.

.2 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.3 Certification:
- .1 Submit in accordance with Section 01 10 10:
  - .1 Certification from glass balustrade system manufacturer that all glass used has been heat-soaked.
  - .2 Certification that glass and glazing materials are compatible.

1.5 QUALITY ASSURANCE

.1 Retain a Professional Engineer, licensed in the Province of Ontario, with experience in Work of comparable complexity and scope, to perform the following services as part of the Work of this Section:
- .1 Design balcony railings and balcony dividers to resist live, dead, lateral, wind, or seismic loads.
- .2 Review, stamp, and sign shop drawings.

.2 Execute welding by firms certified in accordance with CSA W47.1 Division 1 or 2.1. Ensure welding operators are licensed per CSA W47.1 for types of welding required by Work.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Provide a temporary protective coating or other means of protection to protect metal finishes. Do not use adhesive papers or sprayed coatings which will become bonded to the finishes. Remove temporary protection after installation. Do not leave coating residue on any surface.

2 Products

2.1 MATERIALS

.1 General:
- .1 All materials under Work of this Section, including but not limited to, coatings are to have low VOC content limits.
- .2 Wherever possible, metals used in work of this Section are to contain recycled content.

.2 Glazed balcony railings and balcony dividers, as indicated on Exterior Railing Type Schedule, shall be fabricated by Toro Aluminum or approved alternative and come complete with all required components and fasteners for a complete installation.

.3 Aluminum: CSA-S157-M.
- .1 Posts and pickets: extruded aluminum alloy 6005-T6.
- .2 All other parts: extruded aluminum alloy 6063-T6.

.4 Fasteners: Stainless steel, Type 304, for assembling railing parts and for fixing brackets to wall. Base shoes shall be attached to the concrete with quick anchors, hot dipped galvanized, zinc coated. Coloured to match finished metal colour.

.5 Laminated glass: to CAN/CGSB-12.1, Category II, consisting of front layer of minimum 4 mm clear tempered glass, 1.52 mm clear PVB interlayer, and back layer of minimum 4 mm clear tempered glass. Heat strengthening and/or tempered laminated glass as necessary to prevent thermal breakage.

.6 Tempered glass (heat-soaked): CAN/CGSB-12.1-M, Type 2, Class B, Category II, clear, minimum 8 mm thick. As a minimum, following the tempering process, heat-soak glass to a temperature of 290°C±10°C for a minimum of 2 hours of the heat-soak period and cool slowly in accordance with BS EN 14179-1.

.7 Tempered glass: CAN/CGSB-12.1-M, Type 2, Class B, Category II, clear, minimum 6 mm thick.

.8 Bird Friendly Ceramic frit glass: 6 mm thick unless otherwise indicated, glass with ceramic frit coating applied to backside. Ceramic frit: White dot 5 mm in diameter with density coverage of 100 mm on centre in square pattern in accordance with City of Toronto Green Development Standard - Bird-Friendly Development Guidelines. Provide on second surface, locations as shown on Exterior Railing Type Legend. ‘Viraspan Opaque Frit' by Viracon or approved equal.

.9 Divider glass and additional glazing types: In accordance with Section 08 80 00.

.10 Glazing Gaskets: Neoprene, EPDM, or polyvinylchloride of sufficient thickness to be 25% compressed when installed, tensile strength of 13.8 MPa, Durometer A hardness of 50, plus/minus 5.

.11 Setting Blocks: Neoprene or EPDM, Durometer A hardness of 90, plus/minus 5.

.12 Finish: ‘Acrynar FX' by PPG in accordance with AAMA 2604. Colour: As indicated on Exterior Railing Type Schedule.

2.2 FABRICATION

.1 Do not start fabrication until shop and erection drawings have been reviewed, and samples have been approved.

.2 Insofar as practical, fit and assemble in the shop with the various parts or assemblies ready for erection at the building site.

.3 Take field measurements and levels required to verify or supplement those shown on the Drawings for the proper layout and installation of the Work.

.4 Accurately machine file and fit, and rigidly frame together all joints, corners and mitres of metal components.

.5 Provide framing for divider screens between units at balconies as required for installation.

.6 Fabricate divider screen systems for all sides and at 1200 mm o.c., maintain 50 mm clear at face of building and balcony guardrail and 100 mm clearance above level of floor slabs.

.7 Do not mar surface finishes with welds in back of exposed surfaces. Do not deform the exposed metal and finish in any way by welding.

.8 Reinforce assemblies by concealed means. All reinforcing shall be with structural aluminum sections and shall be securely anchored to structure by approved positive mechanical means.

.9 Provide devices for anchoring assemblies to the building structure with sufficient adjustment to permit correct and accurate alignment.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Before commencing installation, examine the Work of other Sections to which Work of this Section will be attached.

.3 Ensure that openings and recesses to receive the Work of this Section are within acceptable tolerances.

3.2 **INSTALLATION**

.1 Erect Work plumb and true and in proper alignment and relationship to established lines and grades.

.2 Use anchoring devices having sufficient adjustment to permit correct accurate alignment. After alignment, positively secure anchorage devices to prevent movement other than that designed for expansion and contraction. Take into consideration climatic conditions prevailing at time of installation.

.3 Site located fixings shall be approved corrosion-resistant materials.

.4 Make the completed installation free from objectionable noise, rattles, wind whistles, and creak or noise due to thermal movement.

.5 Apply a heavy brush-coat of bituminous paint to aluminum, placed in contact with concrete, masonry, mortar or dissimilar metals.

.6 Waterproof penetrations through balcony waterproofing system in accordance with balcony waterproofing membrane manufacturer's instructions.

.7 Clean rabbets and glass edges of dust, dirt, moisture, oil and other foreign matter detrimental to glazing material adhesion.

.8 Accurately size glass to fit openings allowing necessary clearances. Nicks and damaged edge conditions will not be accepted. Replace all glass with nicked or otherwise damaged edges.

.9 Use spacers and shims of proper size where required to support and hold glass in position.

.10 Provide setting blocks at quarter points under glass panels.

.11 Install glass properly centred with uniform bite and face and edge clearance, free from twist, warp or other distortion likely to develop stress.

.12 Joint width between glass panels shall be 6 mm minimum and 10 mm maximum.

.13 Install bird warning glass in accordance with City of Toronto Green Development Standard - Bird-Friendly Development Guidelines.

3.3 **REPAIR**

.1 Inspect units for damage and correct immediately.

.2 Replace all glass with nicked or otherwise damaged surfaces and edges.

3.4 **CLEANING**

.1 Clean surfaces of grime and dirt using acceptable and recommended means and methods.

.2 Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up shop primer damaged during transit and installation, with primer to match shop primer.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for rough carpentry Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.2 ASTM A325, Specification for Bolts Quenched/Tempered Steel Nominal Thread Diameter M16 - M36 For Structural Steel Joints.

.3 ASTM A653, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.4 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

.5 ASTM F1667, Driven Fasteners: Nails, Spikes and Staples.

.6 CAN/CSA O80 Series M, Wood Preservation.

.7 CSA O121-M, Douglas Fir Plywood.

.8 CAN/CSA O141, Softwood Lumber.

.9 CSA O151-M, Canadian Softwood Plywood.

.10 NLGA, Standard Grading Rules for Canadian Lumber, National Lumber Grades Authority

1.3 **SUBMITTALS**

.1 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
  .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
  .2 Identify each regionally extracted and manufactured material, its source and cost.
  .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.4 **QUALITY ASSURANCE**

.1 Lumber identification: Grade stamp of an agency certified by the Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: Grade mark in accordance with applicable CSA standards.

.3 Lumber quality: Carefully select individual pieces so that knots and obvious defects will not interfere with placing bolts, proper nailing or making proper connections.

.4 Moisture Content of wood at time of construction shall be 19% maximum.

.5 Each piece of pressure treated lumber and fire retardant treated lumber shall be shop marked with the pressure treatment brand and ULC monogram respectively, in accordance with CAN/CSA O80-M.

6. Dimensions of lumber shall conform to dressed sizes specified in CAN/CSA-0141 unless actual dimensions are otherwise indicated or specified.

7. Dimensional references to lumber on Drawings and in Specifications are to nominal sizes unless actual dimensions are indicated. Such actual dimensions shall be dry size.

.8 Lumber defects: Discard wood with defects which will render a piece unable to serve its intended function. Lumber will be rejected by Consultant for excessive warp, twist, bow, crook, mildew, fungus, or mould, as well as for improper cutting and fitting, whether or not it has been installed.

1.5 **ENVIRONMENTAL REQUIREMENTS**

1. When it is required that wood maintain dimensional stability and tolerances to ensure accurate installation of later work, store and install it only in dry areas, and where no further installation of moist materials is contemplated.

1.6 **PRODUCT DELIVERY, STORAGE AND HANDLING**

.1 Store materials in a dry area. Cover materials with tarpaulins or polyethylene sheets to prevent moisture absorption and impairment of structural and aesthetic properties. Vent to allow air movement. Tie covering to keep in place.

2 Products

2.1 **MATERIALS**

.1 General:
- .1 Materials used for Work of this Section are to include, but not be limited to the following criteria:
  - .1 Regionally sourced materials.

.2 Certified wood.
.3 Low VOC content limits.

.2 Adhesives - Urea-formaldehyde-free glues.
.3 All dimensional lumber and plywood to be FSC certified.
.4 All composite wood and/or agrifibre products (including core materials) and adhesives used to fabricate laminated assemblies used in building must not contain added urea-formaldehyde.
.5 Material to be sourced regionally from within 800 km of jobsite wherever possible.

.2 Lumber: Softwood, G4S, moisture content 19% or less at time of installation, in accordance with the following:
.1 Lumber shall be of same species and grade, equally seasoned and shall be processed and stamped at same mill.
.2 CSA O141 and NLGA Standard Grading Rules for Canadian Lumber.
.3 Board quality: Construction or better.
.4 Dimension quality:
.1 Structural joists, planks, and framing: No. 1 Select Structural.
.2 Light framing: Construction.

.3 Plywood: CSA O121-M, G1S unsanded, T & G, standard construction, laminated with waterproof adhesive, exterior grade, Thickness as indicated on drawings.

4. Sheathing: Douglas Fir, CSA 0121-M or CSA O151-M; Select-Tight Face, exterior grade, T & G.

.5 Roof lumber: NLGA, Construction grade light framing, Jack Pine, S4S, pressure treated to CAN/CSA-O80 series using copper based waterborne preservative treatment, impregnated to a net retention of 4 kg/ m^3 of preservative unless otherwise specified by preservative manufacturer.

.6 Surface applied wood preservative: Green coloured copper napthenate or 5% pentachlorophenol solution, water repellant preservative or same copper based preservative as used for shop impregnation, in accordance with CAN/CSA O80.

.7 Fire retardant treatment of lumber and plywood (interior and protected locations): ‘Dricon FRT’ fire retardant treatment by Biewer Lumber or approved alternative, conforming to ASTM E84, to provide a flame spread rating of 25 or less.

.8 Rough hardware: Conforming to ASTM F1667; Nails, bolts, screws, anchors, expansion shields, and other fastenings required to frame and fix rough carpentry as follows:
.1 Nails, spikes and staples: Spiral type.
.2 Bolts: ASTM A325; 12.7 mm diameter minimum with nuts and washers unless noted otherwise.
.3 Screws: Countersunk head, full thread type.
.4 Proprietary fasteners: Toggle bolts, expansion shields, lag bolts, screws, inorganic fibre plugs, recommended for purpose by manufacturer.
.5 Galvanize rough hardware used in fire treated wood and hardware exposed to the atmosphere.

.9 Fasteners for use in pressure treated wood: Provide hot dipped galvanized fasteners complying to ASTM A153 and connectors in accordance with ASTM A653, Class G185 for non-structural members. Provide type 304 or 316 stainless steel fasteners and connectors for use in Structural, pressure treated wood.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **GENERAL**

.1 Lay out work carefully and to accommodate work of others. Cut and fit accurately: erect in position indicated by Drawings.

.2 Install rough carpentry to allow for expansion and contraction of the materials.

.3 Cut work into lengths as long as practicable and with square ends. Align, level, square, plumb, and secure work permanently in place. Brace work temporarily as required. Join work only over solid backing.

.4 Bore holes true to line and to same size as bolts. Drive bolts into place for snug fit, and use plates or washers for bolthead and nut bearings. Turn up bolts and lag screws tightly when installed, and again just before concealed by other work or at completion of Work.

.5 Provide anchors, bolts, and inserts required for attachment of the work of this Section, to those performing the work of other Sections and who are responsible for their installation.

.6 Do not attach work by wood plugs or blocking in concrete or masonry. Use lead shields, expansion shields, or similar methods only as approved by Consultant.

3.3 **MISCELLANEOUS WOODWORK**

.1 Fit and install wood furring, strapping, grounds and blocking. Adequately size, correctly place and conceal members for finishes, fitments and for Work under other Sections. Do not assume that Drawings show required work exactly or completely. Anchor wood members securely in place.

.2 Install rough bucks, nailing strips and linings to rough openings as required for backing for frames and other Work.

.3 Except where steel supports are specifically shown, provide wood blocking and supports in metal stud partitions for fastening of item such as casework and other wall mounted accessories. Have respective trades approve the location of such wood blocking.

.4 Bolt wood blocking or nailing strips to steel framing.

.5 Align and plumb faces of furring and blocking to tolerance of 1:600.

.6 Use fire retardant lumber for blocking/framing in ceiling\ spaces, partitions and bulkheads.

3.4 **ROOF WOODWORK**

.1 Install continuous wood nailers around roof perimeters, curbs and roof openings larger than 150 x 150 mm, and at edges of insulation as detailed. Install cut cant strips and continuous nailers on copings and curbs as detailed.

.2 Install wood backing, dressed, tapered and recessed slightly below top surface of roof insulation and roof hopper.

.3 Fasten roof woodwork at maximum 400 mm o.c. in staggered pattern unless noted otherwise.

3.5 **BACKBOARDS**

.1 Install plywood backboards, primed and painted white on both sides, with fire retardant paint.

.2 Use minimum 19 mm thick plywood on 19 x 38 mm furring around perimeter and at maximum 300 mm intermediate spacing.

3.6 **FASTENERS**

.1 Frame, anchor, fasten, tie and brace members for required strength and rigidity.

.2 Use hot dipped galvanized fasteners for exterior Work and Work below grade.

.3 Countersink bolts and bolt heads as required for clearance of other Work.

.4 Size fasteners to penetrate base member by half of fastener length minimum. Minimize splitting of wood members by staggering nails in direction of grain.

.5 For plywood use spiral, annular or resin coated nails and staples.

3.7 **SURFACE-APPLIED WOOD PRESERVATIVE**

.1 Treat raw surfaces, drilled holes and cut ends of pressure treated wood with 2 coats of wood preservative immediately after cutting.

.2 Apply preservative by dipping, by brush or by pouring into plugged holes to completely saturate surface.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products equipment and services necessary for the finish carpentry Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ANSI A208.1, Particleboard.

.2 ANSI A208.2, Medium Density Fibreboard for Interior Use.

.3 ASTM F1667, Driven Fasteners: Nails, Spikes and Staples.

.4 Architectural Woodwork Manufacturers Association of Canada (AWMAC).

.5 Architectural Woodwork Standards (AWS) - Quality Standards for Architectural Woodwork.

.6 CAN/CSA O141, Softwood Lumber.

.7 CSA O151-M, Canadian Softwood Plywood.

.8 National Hardwood Lumber Association (NHLA) Rules for the Measurement and Inspection of Hardwood and Cypress.

.9 National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber.

1.3 **SUBMITTALS**

.1 Shop drawings: Submit shop drawings of finish carpentry Work in accordance with Section 01 10 10 indicating materials, thicknesses, sizes, finishes, wood species, grades, profiles, connection attachments, shop jointing, field jointing, reinforcing, anchorage, fastener types and sizes, location of exposed fastenings, mechanical and electrical service routes, service outlets, cutout locations, and sizes. Include erection drawings, plans, elevations, sections, and details as applicable.

.2 Samples: Submit samples of the following in accordance with the requirements of Section 01 10 10:
   .1 Two representative pieces of each type of wood to receive a stained or natural finish.
   .2 Two representative pieces of each type of wood finished as specified.
   .3 Two of each colour, pattern, gloss, and texture of plastic laminate, in manufacturer's standard tag size.
   .4 Two samples of laminated plastic joints, edging, cutouts and postformed profiles.
   .5 Two samples of melamine surfaced board, edging and postformed profiles.

.6 One of each item of finish carpentry hardware.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.4 QUALITY ASSURANCE

.1 Execute Work of this Section by member of AWMAC, with 5 years experience in finish carpentry Work of comparable complexity and scope. Submit proof of experience upon Consultant's request.

.2 Fabricate finish carpentry Work in accordance with AWS Quality Standards, Premium Quality materials and installation unless otherwise indicated. Perform Work in accordance with the definition of Good Workmanship as defined in the AWS Quality Standards.

.3 Remove and replace finish carpentry Work which does not conform to the AWS Quality standards or as amended by these Specifications.

.4 Mock-up:
- .1 Shop fabricate one mock-up of a base cabinet, wall cabinet, and counter top for each type of surfacing specified, complete with hardware and shop applied finishes, installed in location acceptable to Consultant.
- .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
- .3 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle finish carpentry in accordance with the AWS Quality Standards. Control the temperature and humidity in accordance with the AWS recommendations, before, during, and after finish carpentry delivery, and also during storage and installation.

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

1.6 **EXTENDED WARRANTY**

.1 Submit a extended warranty for plastic laminate work of this Section in accordance with General Conditions, except that warranty period is extended to 2 years from date of Substantial Performance of the Work.
- .1 Warrant against defects in material and workmanship including but not limited to opening of joints, cracking, shrinkage, warpage, and delamination of plastic laminate.
- .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **MATERIALS**

.1 General:
- .1 Materials used for Work of this Section are to include, but not be limited to the following criteria:
  - .1 Regionally sourced materials.
  - .2 Certified wood.
  - .3 Low VOC content limits.
- .2 Adhesives - Urea-formaldehyde-free glues.
- .3 All dimensional lumber and plywood to be FSC certified.
- .4 All composite wood and/or agrifibre products (including core materials) and adhesives used to fabricate laminated assemblies used in building must not contain added urea-formaldehyde.
- .5 Material to be sourced regionally from within 800 km of jobsite wherever possible.

.2 Concealed framing lumber and plywood:
- .1 Eastern Spruce, Balsam Fir, or Jack Pine, to CAN/CSA O141, NLGA, and AWS Custom Grade, S4S, average moisture content 7% +/- 2% at installation.
- .2 Softwood plywood: CSA O151-M; 19 mm unless indicated otherwise, (G2S).

.3 Hardwood lumber: Maple, unless otherwise indicated, to NHLA and AWS Premium Grade, S4S, average moisture content 7% +/- 2% at installation.

.4 Paint grade wood: Conforming to NHLA and AWMAC Premium Grade, S4S, average moisture content 7% +/- 2% at installation.

.5 Plastic laminate:
- .1 Flatwork face sheet: CAN3-A172-M, Grade GP, Type HD; 1.2 mm thick, heavy wear resistance.
- .2 Vertical interior face sheets: CAN3-A172-M, Grade GP, Type LD; 0.8 mm thick.
- .3 Postformed face sheet: CAN3-A172, Grade PF, 0.8 mm thick.
- .4 Backing sheet: CAN3-A172-M, Grade BK, thickness to match face sheet, high pressure laminate, manufactured by same manufacturer as face sheet.

.5 Plastic laminate: As manufactured by Formica or approved alternative by Arborite, Forbo, Nevamar, Pionite and Wilsonart.
.6 Colours: To be selected by Consultant.

6. Melamine Surfaced Particleboard: ANSI A208.1, Grade M2 particleboard with a melamine impregnated decorative paper thermofused onto the surface. Edging to be done in thin PVC to match melamine colour. 'Panval Thermofused Melamine Panels' by Uniboard Canada Inc. Colours as follows:
.1 White for interior millwork surfaces.

.7 Medium Density Fibreboard (MDF): ANSI A208.2; omnidirectional, light coloured with uniform density throughout 'Superior MDF' by G-P Flakboard Ltd. or 'Panfibre Excel MDF' by Uniboard Canada Inc., meeting the following minimum criteria:
.1 Density: 740 kg/m^3.
.2 Internal bond: 0.8 N/mm^2.
.3 Modulus of rupture: 30 N/mm^2.
.4 Modulus of elasticity: 3400 N/mm^2.
.5 Face screw holding: 1450 N.
.6 Core screw holding: 1300 N.
.7 Moisture content: 4-7%.

.8 Particle board core: ANSI A208.1, Grade M2 of thickness indicated. Particleboard to be bound with waterproof adhesive and meeting the following minimum criteria:
.1 Density: minimum 705 kg/m^3.
.2 Internal bond: 0.45 N/mm^2.
.3 Modulus of rupture: 14.5 N/mm^2.
.4 Modulus of elasticity: 2250 N/mm^2.
.5 Face screw holding: 1000 N.
.6 Edge screw holding: 900 N.

.9 Laminating adhesive: CSA O112 Series, water resistant type, low VOC content, selected by laminate manufacturer for intended end use.

.10 Draw bolts and splines: Type as recommended by fabricator.

.11 Nails and staples: Conforming to ASTM F1667; Size and type to suit application, galvanized for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.

.12 Bolts, nuts, washers, blind fasteners, lags and screws: Size and type to suit application. Stapling is not acceptable.

.13 Adhesive and bituminous mastic: Selected by the millwork fabricator with low VOC content.

2.2 HARDWARE

.1 The following hardware is the minimum quality standard for the work of this Section. Alternatives may be considered provided they are approved by Consultant prior to ordering of products.

.2 Drawer slides: Full extension, 8400 Series by Knape & Vogt.

.3 Pilasters: Clear anodized aluminum recessed shelf standards with 12 mm divisions, Model 233 by Knape & Vogt.

.4 Clips: Bright zinc plated, adjustable height shelf supports, Model 256 by Knape & Vogt.

.5 Cabinet hinges: Heavy duty, concealed 110 degree, clip, self closing, Model 75M3550 by Blum.

.6 Drawer and cabinet pulls: 8 mm dia. x 90 mm wide, aluminum, Model CBH220 by Canadian Builders Hardware.

.7 Magnetic catches: Model 918 by Knape & Vogt.

.8 Locks: Cam locks/deadbolt locks complete with lock core by Hafele, type to suit application and installation.

.9 Closet rail: 25 mm diameter wardrobe rail polished chrome plated ‘801.12.205' and brackets ‘803.18.743' by Hafele.

2.3 PLASTIC LAMINATE WORK

.1 Perform plastic laminate Work in accordance with AWMAC Quality Standards and CAN3-A172, Appendix 'A'.

.2 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.3 Laminate plastic laminates to core materials in accordance with manufacturer's instructions.

.4 Fabricate core surfaces and profiles with continuous support and bond over entire surface to receive plastic laminate.

.5 Apply plastic laminate backing sheets to balance shrinkage stresses induced by plastic laminate face sheets.

.6 Minimize joints in plastic laminate Work; do not install joints in plastic laminate Work in less than 2400 mm o.c. Locate joints minimum 610 mm from cut-outs. Offset core and plastic laminate facing joints.

.7 Form shaped profiles and bends as indicated, using postformed grade laminate to laminate manufacturer's instructions.

.8 Use straight self-edging laminate strip to match adjacent colour, finish, gloss, and pattern to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

.9 Apply laminated plastic liner sheet to interior of cabinetry and where indicated.

2.4 **FABRICATION**

.1 Be responsible for methods of construction and for ensuring that materials are rigidly and securely attached and will not be loosened by the work of other sections.

.2 Coordinate locations of concealed supports and blocking with other parts of Work. Provide cutouts for outlet boxes and other fixtures.

.3 Fabricate work in a manner which will permit expansion and contraction of the materials without visible open joints. Conceal joints and connections in wherever possible.

.4 Set nails and countersink screws, apply wood filler to indentations, sand smooth and leave ready to receive finish.

.5 Mitre exposed corners, no end grain shall be visible in completed installation.

.6 Finished millwork shall be free from bruises, blemishes, mineral marks, knots, shakes and other defects and shall be selected for uniformity of colour, grain and texture.

.7 Shelving to cabinetwork to be adjustable unless otherwise noted.

.8 Recess shelf standards, unless noted otherwise. Stagger recessed shelf standards on opposite sides of divider.

.9 Do not exceed maximum 760 mm unsupported span for 19 mm thick shelving. House fixed shelving into gables and divisions.

.10 Shop assemble finish carpentry to accommodate delivery and handling and to ensure passage through building openings.

.11 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.

.12 Fabricate base from paint grade wood 100 mm high x 16 mm thick, finished in accordance with Section 09 91 00.

.13 Window sills:
- .1 Provide all painted wood window sills and aprons where indicated and as detailed.
- .2 Conceal all fixings.
- .3 Include all hardwood trim.
- .4 Provide all solid continuous blocking and shims required for installation.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install Work in accordance with AWS Quality Standards and tolerances for Architectural Woodwork. Set and secure finish carpentry in place, rigid, plumb, square, and level.

.2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate columns, fixtures, outlets, or other projecting, intersecting or penetrating objects leaving a 0.8 mm gap maximum.

.3 Coordinate cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures, in finish carpentry. Round internal corners of cut-outs and seal exposed cores.

.4 Form joints to conceal shrinkage.

.5 Install draw bolts and splines in laminated plastic counter top joints at maximum spacing 450 mm o.c., and 75 mm from edge. Make joints flush, hairline butt joints.

.6 Install finishing hardware accurately and securely in accordance with manufacturer's directions, adjust and clean.

.7 Install prefinished millwork at locations shown on drawings. Position accurately, level, plumb straight.

.8 Apply bituminous coating over wood framing members in contact with masonry or cementitious construction.

.9 Melamine panels: Assemble melamine millwork using dowelled/wafered-and-glue construction. Installed melamine panels shall not show any exposed fasteners on finished/exposed surfaces.

.10 Door frames:
- .1 Butt and cope internal joints of door frames to make snug, tight, joint. Cut right angle joints with mitred joints.
- .2 Fit backs of frames snugly to wall surfaces to eliminate cracks at junction of frame with walls.

.11 Fastening:
- .1 Coordinate wall securement, anchorage, and blocking for finish carpentry items.
- .2 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
- .3 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
- .4 Provide heavy duty fixture attachments for wall mounted cabinets.
- .5 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.

.12 Remove and replace damaged, marked, or stained finish carpentry.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for sheet waterproofing Work in accordance with the Contract Documents.

1.2 **SUBMITTALS**

.1 Product data: Submit manufacturer's Product data in accordance with Section 01 10 10 indicating characteristics, performance criteria, and limitations. Indicate preparation, installation requirements and techniques, Product storage, and handling criteria.

.2 Shop drawings: Submit shop drawings in accordance with Section 01 10 10 indicating location and extent of system and system finish applications; system and joint sealant treatment materials, details of terminations at end of each days work; large scale details, including relationships with adjacent construction; installation sequence and methods; connections; edge treatment at discontinuous edges; and accessories and other pertinent information required for proper and complete installations.

.3 Samples: Submit following samples in accordance with Section 01 10 10:
- .1 Two 300 x 300 mm samples of waterproofing membrane.
- .2 Two samples, 300 mm long, of fastening bar.
- .3 Two samples 300 x 300 mm of protection board.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.5 Certification: Submit installer's certification verifying compliance with specification requirements.

1.3 **QUALITY ASSURANCE**

.1 Qualifications: Execute Work of this Section by manufacturer-approved, skilled, qualified, and experienced workers, trained in installation of Work of this Section.

1.4 **SITE CONDITIONS**

.1 Do not install the Work of this Section outside of following environmental range without Consultant's and Product manufacturer's written acceptance:
.1 Ambient air and surface temperature: 5°C to 38°C.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements before, during, and after installation.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, primers are to have low VOC content limits.

.2 All components of the waterproofing system shall be supplied by one manufacturer.

.3 Primer:
.1 ‘Aquaprime' by Henry Company Canada Inc.
.2 ‘CCW AWP’ by Carlisle Coatings and Waterproofing.
.3 ‘Elastocol Stick H20' by Soprema.
.4 ‘Mel-Prime WB Primer by W. R. Meadows

.4 Mastic:
.1 ‘HE925 - BES Sealant’ by Henry Company Canada Inc.
.2 ‘CCW 704 Mastic’ by Carlisle Coatings and Waterproofing.
.3 ‘Sopramastic 200' by Soprema
.4 ‘Pointing Mastic’ by W. R. Meadows

.5 Sheet waterproofing: 1.5 mm thick, single-ply, self adhering, self sealing, rubberised asphalt, bonded to a cross-laminated high density polyethylene film.
.1 ‘Blueskin WP 200' by Henry Company Canada Inc.
.2 ‘CCW Miradri 860/861’ by Carlisle Coatings and Waterproofing.
.3 ‘Colphene 3000' by Soprema
.4 ‘Mel-Rol’ by W. R. Meadows

.6 Fastening bar: Continuous 25 mm wide x 3 mm thick aluminum bar, predrilled for mechanical attachment.

.7 Protection Board:
.1 ‘990-31' by Henry Company Canada Inc.
.2 ‘CCW Protection Board - V’ by Carlisle Coatings and Waterproofing.
.3 ‘Sopraboard’ by Soprema Inc.
.4 ‘Sealtight Vibraflex Waterproofing Protection Board’ by W. R. Meadows.

.8 Accessories: As recommended by waterproofing system manufacturer.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Verify that existing substrates to receive waterproofing are clean, dry, sound, smooth, and continuous.

.3 Coordinate sealing of interruptions in, and protrusions through waterproofing membrane. Verify that other Work items projecting through waterproofing membrane are in place and are securely installed.

3.2 **MASTIC AND PRIMER**

.1 Fill substrate voids, gaps, depressions, cracks, and joints with mastic until continuous, smooth, substrate for waterproofing is achieved.

.2 Prime substrate surfaces to receive waterproofing in accordance with manufacturer's instructions, at recommended application rate, allow to dry. Vary coverage to suit surface porosity.

.3 Prime surfaces. Re-prime surfaces if not covered with waterproofing membrane within 4 hours.

3.3 **WATERPROOFING**

.1 Install mastic where required to ensure integrity of waterproofing installation at protrusions and other complex details.

.2 Install waterproofing in accordance with manufacturer's instructions.

.3 Lap waterproofing ends and edges 50 mm minimum. Roll waterproofing and laps for continuous adhesion over entire substrate area; use manufacturer's recommended roller.

.4 Extend waterproofing as required to connect to other components of Work comprising waterproofing system.

.5 Cut and fit waterproofing as required for passage of protrusions, ensuring continuous adherence to substrate.

.6 At end of days' Work, trowel mastic water cut-off along uppermost edge of incomplete waterproofing assembly, to prevent loss of adhesion and damage waterproofing.

.7 Supply and install continuous mechanical fastening bar to clamp waterproofing both sides of unfilled gaps, cracks, and joints.

.8 Supply and install protection board in accordance with detailed system, and manufacturer's instructions.

3.4 **REPAIR**

.1 Repair misaligned or inadequately lapped seams, punctures, or other damage with additional ply of waterproofing sized to extend 150 mm minimum in all directions from repair edge.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products equipment and services necessary for installation of blind-side waterproofing Work in accordance with the Contract Documents.

.2 Provide blind-side waterproofing at below grade foundation walls.

1.2 **REFERENCES**

.1 ASTM D5147, Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.

.2 ASTM D5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.

.3 ASTM D5602, Standard Test Method for Static Puncture Resistance of Roofing Membrane Specimens.

.4 ASTM E154, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), physical properties, characteristics, and limitations.
  - .2 Product data for each product indicating: Installation details, physical properties and detailed application and installation instructions.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Location and extent of system, typical layouts, corner details, and special details, joint treatment, details of terminations, method of attachment, connections, edge treatment at discontinuous edges, treatment at tie-backs, and accessories and other pertinent information required for proper and complete installations.
  - .2 Final configuration, sequence, method of attachment to excavation support system, means and methods of supporting membrane externally or internally which will not puncture or injure membrane, and which will prevent sagging or loss of contact with excavation support system;
  - .3 Location of each membrane penetration and membrane penetration details.
  - .4 Large scale details, including relationships with adjacent construction, installation sequence, and methods.

.3 Samples:
- .1 Submit duplicate samples of the following in accordance with Section 01 10 10:
  - .1 Waterproofing membrane, 300 x 300 mm.
  - .2 Fasteners, each type.
  - .3 Miscellaneous accessories, each type.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.5 Certificates:
- .1 Submit manufacturer's certification that waterproofing system materials and accessories supplied are compatible, meet Specification requirements and that installer is approved by membrane manufacturer.
- .2 Submit manufacturer's certification that waterproofing components are approved for use as a complete waterproofing system.
- .3 Submit certification that waterproofing installers and quality control supervisors meet Specification requirements. Submit names of successful membrane installations in which certified personnel have performed tasks of comparable complexity and scope within preceding 5 years.
- .4 Submit inspection reports and certification by manufacturer confirming that installations are in accordance with the Contract Documents and manufacturer's requirements.
- .5 Submit Quality Control Plan detailing quality control procedures to be used to meet manufacturer and Specification requirements. Obtain acceptance of Quality Control Plan from Commission's Representative before starting the Work of this Section.

1.4 QUALITY ASSURANCE

.1 Installer's qualifications: Perform Work of this Section by company approved by Product manufacturer and having 5 years recent experience in Work of comparable complexity and scope.

.2 Ensure membrane manufacturer's representative has full access to this Work for proper inspection prior to and during membrane installation. Provide inspection reports by manufacturer’s representative confirming that installations are in accordance with Product requirements.

.3 Submit Quality Control Plan detailing quality control procedures to be used to meet manufacturer and Specification requirements. Obtain acceptance of Quality Control Plan from Consultant before starting the Work of this section.

.4 Mock-up:
- .1 Construct one 3 m^2 mock-up of waterproofing system in location acceptable to Consultant. Show stages of application and demonstrate performance.
- .2 Obtain Consultant's acceptance. Accepted mock-up may become part of Work. Mark mock-up to Consultant's acceptance and match remainder of work to accepted mock-up. Remove unacceptable mock-up.

.5 Pre-installation meeting: Five days in advance of waterproofing work, arrange meeting on Site to be attended by Consultant, Contractor, waterproofing manufacturer's representative, and any other parties directly affecting the work of this Section to:
- .1 Review methods and procedures related to waterproofing installation, including manufacturer’s written instructions.
- .2 Examine substrate conditions and finishes for compliance with manufacturer’s requirements.
- .3 Review lap and termination details, special waterproofing details, tie-back details, penetrations, and condition of other construction that will affect waterproofing work.
- .4 Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials as factory packaged, sealed and labelled. Handle and protect as necessary to prevent damage or deterioration during shipment, handling and storage. Store materials in a dry location secure from weather and construction operations. Remove damaged materials from the site and dispose of in accordance with applicable regulations

.2 Comply with manufacturer’s printed recommendations for the handling of materials.

1.6 SITE CONDITIONS

.1 Perform work only when existing and forecasted weather conditions are within the guidelines established by the waterproofing membrane manufacturer. Do not apply waterproofing materials in areas of standing or active water; or over ice and snow. Maintain site conditions dry and remove standing water from precipitation or ground water seepage in a timely manner.

1.7 **EXTENDED WARRANTY**

.1 Submit a written warranty for blind side waterproofing Work in accordance with General Conditions, except warranty period extended to ten (10) years, non-prorated, covering both materials and labour against deficiencies, defects and leakage. Promptly correct to satisfaction of Consultant and at no expense to the Owner.

2 Products

2.1 **MATERIALS**

.1 General:
- .1 All materials under Work of this Section, including but not limited to, adhesives and grouts are to have low VOC content limits.
- .2 Use products of only one manufacturer for the Work of this Section.
- .3 Waterproofing system to be complete with all components and accessories as required for complete and water tight installation including but not limited to membrane, tapes, mastics, fasteners, etc.

.2 Waterproofing membrane(Base):
- .1 Vertical Application: 3.0 mm thick self-adhering sheet membrane consisting of composite reinforcement and SBS modified bitumen, with a sanded face and silicone release film; 'Colphene BSW' by Soprema or approved alternative having the following minimum characteristics:
  - .1 Resistance to Hydrostatic Head in accordance with ASTM D5385 modified: 114m (374 ft.) min.
  - .2 Low Temperature Flexibility in accordance with ASTM D5147: Pass at -30ºC.
  - .3 Tensile Strength in accordance with ASTM D5147: 15 / 13.5 kN/m.
  - .4 Puncture Resistance in accordance with ASTM E154: 1210 N.
- .2 Horizontal Application: 3.5 mm thick self-adhering sheet membrane consisting of composite reinforcement and SBS modified bitumen, with a sanded face and thermofusible plastic film; 'Colphene BSW H' by Soprema or approved alternative having the following minimum characteristics:
  - .1 Resistance to Hydrostatic Head in accordance with ASTM D5385 modified: 114 m (374 ft.) min.
  - .2 Low Temperature Flexibility in accordance with ASTM D5147: Pass at -30oC.
  - .3 Tensile Strength in accordance with ASTM D5147: 17 / 12.5 kN/m.
  - .4 Static Puncture Resistance in accordance with ASTM D5602: 400 N.
  - .5 Provide mastic material as required for all penetrations.

.3 Waterproofing membrane(Alternative):
- .1 Horizontal and Vertical Application: 1.85 mm thick composite sheet membrane consisting of elastomeric membrane bonded to three-ply plasmatic matrix and non-woven geotextile fabric. 'Mel-Rol Precon' by W.R. Meadows or approved alternative.

2.2 **ACCESSORIES**

.1 Flashings, primers, adhesive, fasteners, and accessories: Part of the waterproofing system and as recommended by waterproofing membrane manufacturer.

.2 Drainage board: Three-dimensional dimpled core and geotextile fabric complete with adhesive or fasteners as required for installation. ‘Sopradrain 10-G’ by Soprema or ‘Mel-Drain 5012' by W. R. Meadows.

.3 Waterproofing tie back:
- .1 Type 1: Coat tie back head with Mel-Rol Liquid Membrane, cover with Mel-Rol Precon Tape; Tie back system as manufactured by W.R. Meadows or approved alternative.
- .2 Type 2: Waterproofing one-component polyurethane/bitumen coating; Alsan Flashing by Soprema or approved alternative.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Proceed with work only when substrate construction and preparation work is complete and in condition to receive waterproofing work. All plumbing, electrical, mechanical and structural items under or passing through the waterproofing work shall be secured in their proper positions prior to waterproofing work installation.

.3 Have manufacturer's authorized representative verify that conditions are acceptable for installation of membrane waterproofing, including installation of reinforcement and pouring of concrete.

3.2 **PREPARATION**

.1 Inspect all surfaces for any conditions detrimental to the proper completion of the work. Ensures surfaces are structurally sound.

.2 Remove dirt, debris, oil, grease, cement laitance, or other foreign matter which will impair or negatively affect the performance of the waterproofing and drainage system.

.3 Substrate to be sufficient stability to prevent movement during concrete placement. Substrates must be regular and smooth with no gaps or voids larger than 12 mm.

.4 Horizontal Surfaces: Substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over crushed stone or earth, ensure substrate is well compacted to prevent displacement of substrate due to traffic or concrete placement.

.5 Vertical Surfaces: Use a suitable substrate such as permanent or temporary formwork, plywood, or rigid thermal insulation to provide support to the membrane.

.6 Protect adjacent work areas and finish surfaces from damage or contamination from waterproofing products during installation operations.

3.3 **INSTALLATION (BASE)**

.1 Install waterproofing membrane in accordance with reviewed shop drawings and manufacturer's written instructions to provide a continuous waterproofing membrane. Installation instruction specified herein are not complete and shall be supplemented with manufacturer's written installation instructions.

.2 Starting at the high point, adhere membrane to drainage board by removing release paper at the top edge and applying pressure.

.3 Starting at the high point, install the membrane onto the drainage board by peeling back the release film on the underside.

.4 Subsequent rolls must be installed in the same manner and should be aligned with the preceding roll with a side lap of at least 75 mm. End laps must be overlapped at least 150 mm.

.5 Use a roller approved by manufacturer to apply pressure over the entire surface of the membrane to ensure perfect adhesion.

.6 Install detail areas, such as pipe penetrations, pits, connections, expansion joints, and any other special details using the appropriate accessory products and in strict accordance with the manufacturer's installation instructions.

.7 Remove protective release liner exposing self-adhesive strip from between overlaps as the two layers are adhered together. Ensure a continuous bond is achieved without creases.

.8 Coordinate transitions between blind side waterproofing and fluid applied waterproofing to ensure a compatible, watertight seal.

3.4 **INSTALLATION (ALTERNATIVE)**

.1 Install waterproofing in accordance with reviewed shop drawings and manufacturer's instructions.

.2 Vertical Application:
- .1 Mechanically fasten membrane across top of lagging at 300 mm on centre, 12 mm from top, with fasteners.
- .2 Ensure fabric side of membrane is facing interior side of form to receive concrete.
- .3 Apply liquid membrane over areas where fasteners have been attached and carry over top edge.
- .4 Remove release paper on salvage edge of subsequent sheets and overlap edges by 100 mm. Roll press into place.
- .5 Apply coat of pointing mastic 75 mm wide along end to end overlap of sheets.
- .6 Apply 300 mm wide area of detail tape adhesive and fabric detail tape with 150 mm on each side of lap edge at terminations of membrane.
- .7 Inspect membrane prior to pouring of concrete for any punctures or damage.

.3 Horizontal Application:
- .1 Prepare subgrade prior to membrane application to manufacturers written recommendations.
- .2 Ensure fabric side of membrane is facing up.
- .3 Remove release paper on salvage edge of subsequent sheets and overlap edges by 100 mm. Roll press into place.
- .4 For end to end overlap, apply a coat of pointing mastic 75 mm wide along end of sheet.
- .5 Overlap subsequent sheet 75 mm and apply even pressure with a roller to ensure full adhesion.
- .6 Apply 300 mm wide area of detail tape adhesive and fabric detail tape with 150 mm on each side of lap edge at membrane terminations.
- .7 Inspect membrane prior to pouring of concrete for any punctures or damage.
- .8 Include mastic in horizontal waterproofing, seal rebar and penetrations.

.4 Install waterproofing tie back in accordance with manufacturer’s written instructions with necessary fasteners and accessories for complete installation.

3.5 PROTECTION

.1 Protect membrane in accordance with the manufacturer's recommendations until placement of concrete. Inspect membrane for damage just prior to concrete placement and make repairs in accordance with manufacturer's recommendations.

.2 Remove protection before inspection and placing concrete.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products equipment and services necessary for fluid applied waterproofing Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CGSB 37-GP-9Ma, Primer, Asphalt, Unfilled for Asphalt Roofing, Dampproofing and Waterproofing.

1.3 **SUBMITTALS**

.1 Product data: Submit manufacturer's Product data in accordance with Section 01 10 10 indicating installation details, physical properties and detailed application and installation instructions, marked as applicable to Work.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Adjacent construction and typical details, dimensions, thickness, method of attachment, protection and penetration details.
  - .2 Location of each membrane penetration.

.3 Samples:
- .1 Submit the following samples in accordance with Section 01 10 10. Submit two samples of the following:
  - .1 Each type of waterproofing membrane, 300 x 300 mm.
  - .2 Protection board and filter fabric, 300 x 300 mm.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.5 Certificates:
- .1 Submit certifications for items required at least 8 weeks prior to installation of Work of this Section.
- .2 Submit manufacturer's certification that waterproofing system materials and accessories supplied are compatible, meet Specification requirements and that installer is approved by membrane manufacturer.
- .3 Submit manufacturer's certification that waterproofing components are approved for use as complete waterproofing system.

.4 Submit Contractor's certification that waterproofing installers and quality control supervisors meet Specification requirements. Submit names of successful membrane installations in which certified personnel have performed tasks of comparable complexity and scope within preceding 5 years.

.5 Submit inspection reports and certification by manufacturer confirming that installations are in accordance with manufacturer's requirements.

1.4 QUALITY ASSURANCE

.1 Installer's qualifications: Perform Work of this Section by company, approved by Product manufacturer and having 5 years recent experience in Work of comparable complexity and scope.

.2 Mock-up:

.1 Construct one 10 m^2 mock-up of waterproofing system in a location acceptable to the Consultant. Show stages of application.

.2 Demonstrate one lap joint, one inside corner, and one outside corner.

.3 Obtain Consultant's acceptance. Accepted mock-up may become part of the Work. Mark mock-up to Consultant's acceptance and match remainder of work to accepted mock-up. Remove unacceptable mock-up.

.3 Pre-installation meeting: Arrange with manufacturer's representative to inspect substrates and review installation procedures 48 hours in advance of installation.

1.5 SITE CONDITIONS

.1 Maintain air temperature and structural base temperature at waterproofing installation area above 5°C for 24 h before, during and 24 hr after installation or according to manufacturer’s requirements.

.2 Do not apply waterproofing in wet weather.

.3 Ventilate area by forced air circulation during installation and curing periods for enclosed applications.

1.6 EXTENDED WARRANTY

.1 Submit a extended written warranty for fluid applied waterproofing in accordance with the General Conditions, except that warranty period is extended to 10 years from date of Substantial Performance of the Work.

.1 Warrant Work against water leakage and failure to stay in place.

.2 Coverage: Complete replacement including effected adjacent Work.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, primers are to have low VOC content limits.

.2 Use products by only one manufacturer throughout Work of this Section.

.3 Primer: conforming to CGSB 37-GP-9Ma;
- .1 ‘CCW 550' by Carlisle Coatings and Waterproofing.
- .2 ‘6170' by Hydrotech Membrane Corporation.
- .3 ‘PQ 6109’ by Tremco.

.4 Elastomeric reinforcement (standard duty - 1.2 mm):
- .1 ‘CCW 711-60’ by Carlisle Coatings and Waterproofing.
- .2 ‘6147' by Hydrotech Membrane Corporation.
- .3 ‘Elastomeric Sheeting' by Tremco.

.5 Elastomeric reinforcement (heavy duty - 1.5 mm):
- .1 ‘CCW 711-90' by Carlisle Coatings and Waterproofing.
- .2 ‘6146' by Hydrotech Membrane Corporation.
- .3 ‘Butyl Sheeting' by Tremco.

.6 Securement bar: Continuous 25 mm wide x 3 mm thick aluminum bar, predrilled for mechanical attachment.

.7 Joint backing: Heat resistant, expanded closed-cell cross-linked polyethylene; ‘Backer Rod’ by Tremco, ‘Cera-Rod Backer Rod’ by W. R. Meadows or approved alternative as recommended by fluid applied waterproofing manufacturer and approved by Consultant to suit application.

.8 Fabric reinforcement:
- .1 ‘CCW 500R' by Carlisle Coatings and Waterproofing.
- .2 ‘Reemay 2014' by Hydrotech Membrane Corporation.
- .3 ‘Reinforcing Fabric (2014)' by Tremco.

.9 Waterproofing membrane: One-part, 100% solids, rubberized asphalt.
- .1 ‘CCW 500' by Carlisle Coatings and Waterproofing.
- .2 ‘6125' by Hydrotech Membrane Corporation.
- .3 ‘Tremproof 6100' by Tremco.
- .4 ‘790-11' by Henry Company Canada.

.10 Protection board: Asphaltic protection board such as Type No. 70, 3 mm thick ‘Vibra Flex’ by W. R. Meadows or approved alternative shall be used on horizontal surfaces on the garage roof slab. On vertical surfaces the protection board shall be a 3 mm thick plastic board.

.11 Protection Sheet: Reinforced modified bituminous membrane as recommended by manufacturer.

.12 Separation sheet: 0.2 mm thick minimum, polyethylene sheet.

.13 Precast Pavers: Non-interlocking wire reinforced pavers, minimum 87 kg/m2, maximum 107 kg/m2, 5% air-entrainment, minimum 55MPa compressive strength, non-slip texture finish, chamfered edges, patio quality, conforming to CSA A231.1/A231.2.

.14 Pedestals: Provide pedestals at each corner of paving slabs to product a level, smooth surface for pedestrian traffic; 'Pavel-el' by Envirospec Inc. or approved alternative.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Have manufacturer's authorized representative verify that conditions are acceptable for installation of membrane waterproofing.

3.2 **SUBSTRATE PREPARATION AND PROTECTION**

.1 Allow concrete substrates to cure minimum of 28 days prior to surface preparation or to Consultant's acceptance.

.2 Ensure that form tie holes, honeycombed areas, and other voids and holes which may impair performance of waterproofing membrane, are filled flush and are dry.

.3 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and foreign matter detrimental to the adhesion of the hot rubberized asphalt.

.4 Remove debris from deck, blow substrate surfaces clean using oil-free compressed air.

.5 Abrasive blast (track blast) concrete surfaces to be waterproofed to profile required by waterproofing manufacturer.

.6 Prohibit traffic, on prepared areas to be waterproofed, until Work of this Section is completed.

.7 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from Work of this Section.

.8 Heated top portion of the residential ramp - High Stability HL3 Asphalt installed over hot applied asphaltic waterproofing membrane with embedded electric heating cables.

3.3 **PRIMER**

.1 Prime substrate surfaces in accordance manufacturer's instructions.

.2 Apply primer uniformly as a fine spray at a rate 10 m^2/l; prevent over-spray and ponding of primer. Allow primer to dry fully before applying waterproofing membrane.

3.4 **REINFORCEMENT GENERAL**

.1 Fabric and membrane reinforcing sheets:
- .1 Overlap 150 mm at end laps and seal with waterproofing membrane.
- .2 Prevent wrinkles and fishmouths.
- .3 Wrap outside horizontal and vertical corner with 150 mm membrane reinforcement embedded in waterproofing membrane.
- .4 Supply and install heavy duty membrane reinforcement at drains and protrusions.

3.5 **CRACK AND JOINT TREATMENT**

.1 Horizontal substrate cracks and joints, under 3 mm wide including control joints:
- .1 Seal with 150 mm wide, continuous fabric reinforcing embedded into 3 mm thick, 300 mm wide strip coating of waterproofing membrane. Centre fabric reinforcing on crack or joint and extend both waterproofing membrane and fabric reinforcing minimum 50 mm beyond end of crack or joint.

.2 Horizontal substrate cracks and joints, over 3 mm wide (excluding expansion joints):
- .1 Seal with 150 mm wide, continuous membrane reinforcing embedded into 3 mm thick, 300 mm wide strip coating of waterproofing membrane. Centre membrane reinforcement on crack or joint and extend both waterproofing membrane and membrane reinforcing minimum 50 mm beyond end of crack or joint.

.3 Horizontal to vertical junctures and vertical construction joints:
- .1 Seal with 300 mm wide, continuous membrane reinforcing embedded into 3 mm thick, 450 mm wide strip coating of waterproofing membrane. Centre membrane reinforcing on juncture extending 150 mm onto both horizontal and vertical surfaces. Supply and install continuous fastening bar along top edge of membrane reinforcement.

.4 Horizontal to vertical junctures and vertical control joints (excluding expansion joints):
.1 Seal with 400 mm wide, continuous heavy duty membrane reinforcing embedded into 3 mm thick, 550 mm wide strip coating of waterproofing membrane. Centre heavy duty membrane reinforcing on juncture extending 200 mm onto both horizontal and vertical surfaces. Supply and install continuous fastening bar along top edge of heavy duty membrane reinforcement.

3.6 **EXPANSION JOINTS**

.1 Horizontal:
.1 Seal with 400 mm wide, continuous heavy duty membrane reinforcing looped 1.5 x joint width and embedded into 3 mm thick, 550 mm wide strip coating of waterproofing membrane.
.2 Centre heavy duty membrane reinforcing on expansion joint extending 150 mm minimum onto both surfaces.
.3 Supply and install joint backing and waterproof membrane to fill loop to flush.

.2 Vertical:
.1 Seal with 400 mm wide, continuous heavy duty membrane reinforcement looped 1.5 x joint width and embedded into 3 mm thick, 550 mm wide strip coating of waterproofing membrane.
.2 Centre heavy duty membrane reinforcement on expansion joint extending 150 mm minimum onto both surfaces.
.3 Fill loop with joint backing and coat with waterproof membrane.
.4 Supply and install continuous fastening bars on both sides of expansion joint.

.3 Horizontal to vertical junctures:
.1 Seal with 500 mm wide, continuous heavy duty membrane reinforcing embedded into 3 mm thick, 550 mm wide strip coating of waterproofing membrane.
.2 Centre heavy duty membrane reinforcing on juncture extending 200 mm onto both horizontal and vertical surfaces. Supply and install continuous fastening bar along top edge of heavy duty membrane reinforcement.
.3 Supply and install joint backing and waterproofing membrane to fill loop to flush.

3.7 **WATERPROOFING MEMBRANE**

.1 Install waterproofing membrane in accordance with accepted shop drawings and manufacturer's instructions.

.2 Use manufacturer's recommended installation equipment and carefully monitor waterproofing membrane kettle temperatures.

.3 Install first layer of waterproofing membrane to a uniform minimum thickness of 2 mm and an average of 3 mm, forming a continuous monolithic coating over horizontal and vertical surfaces.

.4 Embed fabric reinforcement into hot membrane, overlap fabric 50 mm, ensure one layer of waterproofing membrane between overlaps.

.5 Install second layer of waterproofing membrane to minimum thickness of 3 mm for total membrane thickness of 5-6 mm minimum.

.6 Reinforce corners with 2 plies of fabric reinforcement, overlap sides and ends 100 mm.

3.8 **PROTECTION BOARD AND ACCESSORIES**

.1 Supply and install protection board or separation sheet in accordance with detailed system, and manufacturer's instructions.

.2 Roof pavers: Install pavers on pedestals, one at each corner, in locations shown butted tightly, maximum 6 mm gap. Adjust or Shim up as required to obtain smooth surface transition from slab to slab.

3.9 **RAMP SLAB TRAFFIC TOPPING SYSTEM**

.1 Remove all dirt, grease, oil, and other bond inhibiting materials on the ramp by shotblasting. Areas on the ramp slab not accessible to shotblasting machine such as near vertical faces and walls shall be sandblasted or mechanically wire brushed to remove all loose bond inhibiting materials. The prepared surface shall be primed within 72 hrs. after shotblasting. Any dirt, debris, or bond inhibiting material which accumulates on the ramp slab surface during this period shall be removed by means approved by Consultant.

.2 Install asphalt primer.

.3 The waterproofing system shall be a 2-ply fabric reinforced, hot applied rubberized asphaltic membrane ‘Bridge Grade’ - (Bemalistic 1213 BMD as manufactured by McAsphalt, or Ultraseal 3750 as manufactured by Ultraseal Waterproofing & Sealants Technologies Inc. or Bakor 790-11-MTO as manufactured by Henry-Bakor or approved alternative), reinforced with reemay, (4-6 mm total membrane thickness). The initial coat of waterproofing membrane shall be installed having a minimum thickness of 2 mm and maximum 3 mm. Cover the initial coat of waterproofing membrane with a layer of spun-bonded polyester fabric reinforcement while the membrane is still hot. Overlap edges a minimum of 50 mm. Install the final layer of membrane to obtain a uniform minimum thickness of 2 mm and maximum 3 mm so that the reinforcement fabric is completely embedded in the waterproofing membrane. (Total thickness of membrane shall be 4 to 6 mm maximum).

.4 Install asphaltic protection board such as Type No. 70, 3 mm thick ‘Vibra Flex’ by W. R. Meadows or approved alternative.

.5 Install High Stability HL3 asphalt over the protection board in three (3) lifts as follows:
   .1 Install the 1st lift of asphalt 30 mm compacted thickness over the protection board using an asphalt spreader machine.

.2 Install electric heating cables strapped to the asphalt.

.3 Install the 2nd lift of asphalt 30 mm compacted thickness by had in order not to damage cables.

.4 Install the 3rd lift of asphalt 30 mm (surface course) using an asphalt spreader. (total thickness of the 3 lifts of HL3 High Stability asphalt shall be 90 mm).

3.10 FIELD QUALITY CONTROL

.1 Coordinate inspection and testing of fluid applied waterproofing with Consultant.

.2 Temporarily plug drains and dam horizontal surface areas to be tested. Flood with water to minimum depth of 80 mm. Maintain flooded depth for 24 h. Have manufacturer's representative and Consultant witness test.

.3 If leaks occur repair in accordance with manufacturer's instructions and retest.

3.11 PROTECTION

.1 Supply and install temporary protection and barricades to prevent mechanical damage or contamination such as oils or solvents, until waterproof membrane assembly is covered by subsequent parts of Work.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for the application of fluid applied waterproofing at storm water tank in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM C836, Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Materials list of items to be provided under this Section.
  - .2 Manufacturer's specifications and other data needed to ensure compliance with the specified requirements including but not limited to installation details and physical properties.
  - .3 Manufacturer's current recommended installation procedures.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Materials, adjacent construction and typical details, dimensions, thickness, crack and joint treatment, method of attachment, protection and penetration details and relationship to adjacent construction.
  - .2 Location of each membrane penetration.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certificates:
- .1 Submit certifications for items required at least 4 weeks prior to installation of Work of this Section.
- .2 Submit manufacturer's certification that waterproofing system materials and accessories supplied are compatible, meet Specification requirements and that installer is approved by membrane manufacturer.

.3 Submit inspection reports, within 3 working days after each inspection, and certification by manufacturer confirming that installations are in accordance with manufacturer's requirements.

1.4 QUALITY ASSURANCE

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in the installation of fluid applied waterproofing of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.

.2 Mock-up:
- .1 Construct one 10 m^2 mock-up of waterproofing in location acceptable to Consultant.
- .2 Demonstrate as a minimum one inside corner, surface preparation, and typical installation.
- .3 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
- .4 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
- .5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

.3 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials to job site in manufacturer's unopened containers with all labels intact and legible at time of use.

.2 Maintain the products in accord with manufacturer's recommendations with proper precautions to ensure fitness of material when installed.

1.6 SITE CONDITIONS

.1 Do not install Work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
- .1 Ambient air and surface temperature are below: 5°C.
- .2 Precipitation: None.

.2 Ensure that temperature of substrate and its moisture content conforms to manufacturer's minimum requirements, before proceeding with work.

.3 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after installation.

1.7 **EXTENDED WARRANTY**

.1 Submit a extended written warranty for concrete tank waterproofing in accordance with the General Conditions, except that warranty period is extended to 5 years from date of Substantial Performance of the Work.
- .1 Warrant Work against defects including adhesive failure, cohesive failure, waterproofing failure, and water leakage.
- .2 Coverage: Complete replacement including effected adjacent Work.

2 Products

2.1 **MATERIALS**

.1 Concrete tank waterproofing system: ASTM C836, Two-part polymer modified cementitious based coating protection systems for storm water tank. Used for interior and exterior applications where positive or negative side waterproofing is required. ‘ECTOFlex 646' by EDCO Technologies Inc. or approved alternative.

.2 Primer, sealants and additional accessories: As recommended by waterproofing system manufacturer.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Verify that existing substrates to receive waterproofing are clean, dry, sound, smooth, and continuous.

3.2 **PREPARATION**

.1 Allow concrete substrates to cure 24 to 48 hours prior to surface preparation.

.2 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and foreign matter detrimental to the adhesion of the hot rubberized asphalt.

.3 Clean all surfaces to receive membrane system in accord with manufacturer's instructions; vacuum clean or blow clean with oil-free compressed air all surfaces to receive waterproofing membrane and accessories. Protect adjacent surfaces not being waterproofed.

.4 Rout, clean, prepare and detail surface cracks form tie holes, honeycombed areas, and other voids and holes which may impair performance of waterproofing membrane in accordance with manufacturer's instructions; install backer rod where required.

.5 Clean metal surfaces to bright metal by wire brushing or mechanical etching; scuff-sand lead flashing and plastic surfaces.

.6 Install detail cants, detail coats, joint and crack treatments, and liquid flashings in accord with manufacturer's instructions.

.7 Allow detail applications to cure in accord with manufacturer's instructions prior to general application of membrane.

.8 Prime surfaces in accord with manufacturer's instructions.

.9 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from Work of this Section.

.10 Coordinate sealing of interruptions in, and protrusions through waterproofing membrane. Verify that other Work items projecting through waterproofing membrane are in place and are securely installed.

3.3 **INSTALLATION**

.1 Apply primer, sealant and bond breaker tape in accordance with manufacturer's instructions.

.2 Install waterproofing in locations indicated on drawings. Continue membrane up wall to a minimum of 150 mm above final grade line or previously determined elevation.

.3 All shrinkage cracks to be treated with 1.5 mm coating of waterproofing, 150 mm wide centred over cracks.

.4 Grid surfaces to assure proper coverage rates and verify membrane wet-film mil thickness with gauges as work progresses.

.5 Roller, squeegee, or trowel apply fluid waterproofing membrane to provide a minimum thickness of 1.5 mm in accordance with manufacturer’s written instructions and ASTM C836.

.6 Install a 25 mm cant of waterproofing at all horizontal-vertical junctures and projections.

.7 Ensure complete coverage to substrate, around flashings and protrusions and at changes in direction of surface. Work material into any fluted rib forming indentations.

.8 Extend waterproofing as required to connect to other components of Work comprising waterproofing system.

.9 When applying waterproof membrane, work membrane material well into surface of the concrete, filling surface pores and hairline cracks.

3.4 **PROTECTION**

.1 Supply and install temporary protection and barricades to prevent mechanical damage or contamination such as oils or solvents, until waterproof membrane assembly is covered by subsequent parts of Work.

3.5 **FIELD QUALITY CONTROL**

.1 Flood test:
- .1 Do not conceal waterproofing until inspection and testing are completed to satisfaction of Consultant.
- .2 Temporarily plug drains and dam horizontal surface areas to be tested and flood with water to minimum depth of 50 mm.
- .3 Maintain flooded depth for 24 hours.
- .4 If leaks occur repair and retest.
- .5 Remove water at end of test.

3.6 **CLEANING**

.1 Clean to Consultant's approval, soiled surfaces, spatters, and damage caused by work of this Section.

.2 Check area drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from site.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for the application of crystalline waterproofing Work in accordance with the Contract Documents.

.2 Work of this Section to include the following:
.1 Crystalline waterproofing at interior floor and walls of elevator pit(s).

1.2 **SUBMITTALS**

.1 Product data:
.1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
.1 Performance criteria, installation details, physical properties, detailed application and installation instructions, and limitations.
.2 Product transportation, storage, and handling requirements.

.2 Shop drawings: Submit shop drawings in accordance with Section 01 10 10 indicating materials, details, dimensions, thickness, treatment of joints and cracks, protection, penetration details, and relationship to adjacent construction.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
.1 Indicate cost, post consumer and pre-consumer recycled content for each product.
.2 Identify each regionally extracted and manufactured material, its source and cost.
.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certificates:
.1 Submit certifications for items required at least 4 weeks prior to installation of Work of this Section.
.2 Submit manufacturer's certification that waterproofing system materials and accessories supplied are compatible, meet Specification requirements and that installer is approved by membrane manufacturer.
.3 Submit inspection reports, within 3 working days after each inspection, and certification by manufacturer confirming that installations are in accordance with manufacturer's requirements.

1.3 QUALITY ASSURANCE

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in the installation of crystalline waterproofing of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.

.2 Crystalline waterproofing system shall be tested in accordance with the following standards and conditions, and the testing results shall meet or exceed the performance requirements as specified herein:

- .1 Independent Laboratory: Testing shall be performed by an independent laboratory meeting the requirements of the Standards Council of Canada. Testing laboratory shall obtain all concrete samples and water proofing product samples.
- .2 Crystalline Penetration: Crystallizing capability of waterproofing material shall be evidenced by independent SEM (Scanning Electron Microscope) photographs documenting penetration of crystal-forming waterproofing material to a depth of 50 mm.
- .3 Permeability:
  - .1 Independent testing shall be performed according to U.S. Army Corps of Engineers CRD C48-73 "Permeability of Concrete".
  - .2 Concrete samples (treated and untreated) to have design strength of 13.8 MPa and thickness of 50 mm. No admixtures permitted.
  - .3 Coatings to have maximum thickness of 1 mm per coat with up to two coats permitted.
  - .4 Samples to be pressure tested to 1.2 MPa (121.5 m head of water).
  - .5 Treated samples, after crystalline growth has occurred, shall exhibit no measurable leakage.
- .4 Chemical Resistance:
  - .1 Independent testing shall be performed according to ASTM C267 "Chemical Resistance of Mortars" and ASTM C39 "Compressive Strength of Cylindrical Concrete Specimens".
  - .2 Concrete samples (treated and untreated) to have design strength of 27.6 MPa. No admixtures permitted.
  - .3 Coatings to have maximum thickness of 1 mm per coat with up to two coats permitted.
  - .4 Untreated and treated specimens to be immersed for a minimum of 84 days in following chemical solutions: hydrochloric acid (3.5pH), brake fluid, transformer oil, ethylene glycol, toluene, caustic soda.
  - .5 Treated specimens shall exhibit no detrimental effects after exposure, and shall have a minimum of 14% increase in compressive strength versus untreated control specimens.
  - .6 Potable Water Approval: Independent testing shall be performed according to NSF Standard 61 and approval for use of waterproofing material on structures holding potable water shall be evidenced by NSF certification.

.3 Mock-up:
- .1 Construct one 4 m^2 mock-up of waterproofing in location acceptable to Consultant.
- .2 Demonstrate as a minimum one inside corner, one outside corners, surface preparation, and typical installation.
- .3 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
- .4 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
- .5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

.4 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Store packaged materials in original undamaged containers with manufacturers labels and seals intact, in dry enclosed area, off the ground. Prevent damage of materials during handling and storage.

.2 Handle and store materials in accordance with manufacturers written instructions.

1.5 SITE CONDITIONS

.1 Do not install Work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
- .1 Ambient air and surface temperature are below: 5°C.
- .2 Precipitation: None.

.2 Ensure that temperature of substrate and its moisture content conforms to manufacturer's minimum requirements, before proceeding with work.

.3 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after installation.

1.6 EXTENDED WARRANTY

.1 Submit a warranty for crystalline waterproofing work in accordance with the Conditions of the Contract, except that warranty period is extended to five years.
- .1 Warrant work against leakage.
- .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **MATERIALS**

.1 Crystalline Waterproofing system: Furnish a waterproofing system comprising of cement quartz and other non-toxic chemicals, and additives which, on contact with moisture, produce a crystalline growth throughout the capillary voids in the concrete. 'Permaquik Crystalline Waterproofing' by Tremco, ‘Cem-Kote CW Plus’ by W.R. Meadows or equivalent product(s) by Xypex Chemical Corporation.

2.2 **MIXES**

.1 Mix waterproofing material, by volume with clean water free from salt and deleterious materials, to the required proportions and consistency in accordance with manufacturer's written recommendations to achieve.

.2 Mix waterproofing material in quantities that can be applied within 20 to 30 minutes from time of mixing.

.3 As mixture thickens, stir frequently, but do not add additional water. Do not mix bonding agents or admixtures with crystalline waterproofing materials.

3 Execution

3.1 **EXAMINATION**

.1 Verify that concrete surfaces are sound and clean, and that form release agents and materials used to cure the concrete are compatible with waterproofing treatment.

.2 Examine surfaces to be waterproofed for form tie holes and structural defects such as honeycombing, rock pockets, faulty construction joints and cracks. Such defects to be repaired in accordance with manufacturer's written instructions.

3.2 **PREPARATION**

.1 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance. Obtain manufacturer's approval of substrate in writing, submit copy to Consultant.

.2 Concrete surfaces to receive waterproofing shall have an open capillary system to provide tooth and suction, and shall be free from scale, excess form oil, laitance, curing compounds and foreign matter.

.3 Smooth surfaces or surfaces covered with excess form oil or other contaminants shall be washed, lightly sand-blasted, water-blasted, or acid etched with muriatic acid as necessary to provide a clean absorbent surface. Surfaces to be acid-etched shall be saturated with water prior to application of acid.

.4 Surface defects shall be repaired in accordance with manufacturer's instructions and as follows:

.1 Form Tie Holes, Construction Joints, Cracks: Chip out defective areas in a "U" shaped slot 25 mm wide and a minimum of 25 mm deep. Clean slot of debris and dust. Soak area with water and remove excess surface water. fill the foregoing with material suited for the purpose by the material manufacturer and finish flush to wall.

.2 Rock Pockets, Honeycombing or Other Defective Concrete: Rout out defective areas to sound concrete. Remove loose materials and saturate with water. Remove excess surface water and fill with material suited for the purpose by the material manufacturer and finish flush to wall.

.3 Prior to application of waterproofing treatment, thoroughly saturate concrete surfaces with clean water as required to ensure migration of crystalline chemicals into voids and capillary tracts of the concrete. Remove free surface water before application.

3.3 INSTALLATION

.1 Install crystalline waterproofing in accordance with reviewed shop drawings and manufacturer's written instructions.

.2 Construction Joints: Apply waterproofing in slurry form at a minimum rate of 1.0 kg/m^2 to joint surfaces between concrete pours. Moisten surfaces prior to slurry application. Where joint surfaces are not accessible prior to pouring new concrete, consult manufacturer for application procedure.

.3 Walls:

.1 Apply waterproofing uniformly to concrete surfaces with semi-stiff bristle brush or broom, or suitable spray equipment.

.2 Apply waterproofing in 2 coats to a minimum application rate of 1.0 kg/m^2.

.3 When brushing, work slurry well into surface of the concrete, filling surface pores and hairline cracks. When spraying, hold nozzle close enough to ensure that slurry is forced into pores and hairline cracks.

.4 Slabs:

.1 Remove ponding water on slab and allow concrete to dry to a damp appearance.

.2 Over freshly floated concrete, broadcast waterproofing material dry onto concrete at time in initial set at a minimum rate of 1.0 kg/m^2. Float and then machine trowel concrete to a smooth, level and dense surface. Free from trowel marks, ridges, pinholes, and other defects.

.3 If it is not possible to broadcast waterproofing onto slab, waterproofing can be installed in slurry form. Application would be similar to wall application specified herein.

3.4 **CURING**

.1 Begin curing as soon as waterproofing has hardened sufficiently so as not to be damaged by a fine spray. Cure waterproofing with a mist fog spray of clean water three times a day for 2 to 3 days, or cover treated surfaces with damp burlap for the prescribed period. In warm climates, more than three sprayings per day may be necessary to prevent excessive drying of coating.

.2 During the curing period, protect treated surfaces from damage by wind, sun, rain and temperatures below 2°C. If plastic sheeting is used for protection, it must be raised off of waterproofing coating to allow sufficient air circulation.

3.5 **FIELD QUALITY CONTROL**

.1 Flood test:
- .1 Do not conceal waterproofing until inspection and testing are completed to satisfaction of Consultant.
- .2 Temporarily plug drains and dam horizontal surface areas to be tested and flood with water to minimum depth of 50 mm.
- .3 Maintain flooded depth for 24 hours.
- .4 If leaks occur repair and retest.
- .5 Remove water at end of test.

3.6 **CLEANING**

.1 Clean to Consultant's approval, soiled surfaces, spatters, and damage caused by work of this Section.

.2 Check area drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from site.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for traffic coatings Work in accordance with the Contract Documents.

1.2 **DESIGN REQUIREMENTS**

.1 Design topping system waterproofing membrane to allow for structural movement or deflection of building, and span cracks in substrate surfaces to maximum 1.5 mm wide which may occur after installation of coatings.

.2 Design traffic coatings for vehicular traffic.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, characteristics, limitations, preparation, and installation requirements and techniques.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings indicating sections, details, materials, thicknesses, finishes, joint layout and locations, and coating terminations in accordance with Section 01 10 10.

.3 Samples: Submit two 300 x 300 mm samples, on cement board, of traffic coatings at parking areas, drive lanes, and ramps and turns in accordance with Section 01 10 10.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.5 Reports/Certificates:
- .1 Submit manufacturer's written acceptance of substrate prior to installation. Submit verification of moisture content of floor prior to installation.
- .2 Submit applicator’s current certificate of approval, for installation of traffic coatings, by the material manufacturer as proof of compliance.

.3 Submit letter certifying that materials proposed for use on this project meet criteria specified, are compatible with each other, and that the manufacturer recommended the product for it's intended end use.

.4 Submit certification from traffic coatings manufacturer that installation meets specified and manufacturer's requirements.

.6 Closeout submittals: Submit maintenance data for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10.

1.4 QUALITY ASSURANCE

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in traffic coating installations of a similar size and nature and that is approved by manufacturer.

.2 Mock-up:

.1 Construct 10 m^2 mock-up of traffic coating in location acceptable to Consultant.

.2 Mock-up shall demonstrate the minimum standard for workmanship, material thicknesses, surface profile, joint sealing, crack, flashing, and juncture details, slip resistance, and finished appearance.

.3 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.

.4 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.

.5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

.3 Pre-installation meetings: Arrange with Consultant, manufacturer's representative, and traffic coatings applicator to inspect substrates, and to review installation procedures 48 hours in advance of installation.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.

.2 Store product in location protected from freezing, damage, construction activity, precipitation, and direct sunlight, in strict accordance with manufacturer's recommendations.

.3 Prior to application, condition products in accordance with manufacturer's recommendations.

.4 Handle all products with appropriate precautions and care as stated on Material Safety Data Sheet.

1.6 **SITE CONDITIONS**

.1 Do not install Work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
- .1 Ambient air and surface temperature: 4°C to 32°C.
- .2 Relative Humidity: 80%.
- .3 Moisture content of concrete is above 4% by weight of concrete.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 48 hours before, during, and 72 hours after installation.

1.7 **EXTENDED WARRANTY**

.1 Submit a warranty for Work of this Section in accordance with Conditions of the Contract, except that warranty period is extended to 2 years for the following:
- .1 Warrant against failure to meet design criteria, leaking, failure to stay in place, deformation, and breaking of watertight seals.
- .2 Coverage: Complete replacement including affected adjacent Work at no cost to Owner.

2 Products

2.1 **MATERIALS**

.1 Traffic Coating System: High solids polyurethane waterproofing, traffic bearing membrane system. Colour to be selected by Consultant from manufacturer's standard colours. Traffic coating system shall be low V.O.C. compliant and include all flashings, sealants, aggregates, and accessories for a complete installation. Acceptable system: 'Conipur II Deck Coating System' by BASF Building Systems as follows:
- .1 Primer: 'Conipur 78' two component polyurethane-based adhesive primer.
- .2 Base coat:: 'Conipur 265' two component fast-curing polyurethane base coat.
- .3 Top coat:
  - .1 Interior: 'Conipur 275' two component fast-curing aromatic polyurethane topcoat, high tensile strength, tear and abrasion resistance.
  - .2 Exterior: 'Conipur 295' two component, aliphatic, 100% solids urethane waterproof membrane.
- .4 Or approved alternative systems by Advanced Polymer Technologies, Duochem Inc., Neogard Construction Coatings and Technical Barrier Systems.

.2 Traffic paint: White, as recommended by traffic coating system manufacturer.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance.

.3 Verify that specified environmental conditions are ensured before commencing work.

.4 Test surfaces for moisture content to ensure that they are suitable for application.

3.2 **PREPARATION**

.1 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from Work of this Section.

.2 Thoroughly clean all surfaces to receive coating by steel shotblasting or other method in accordance with manufacturer’s written instructions. Shotblast or mechanically abrade all vertical concrete surfaces to receive traffic coating to a height of 150 mm. Areas not accessible to shotblasting machine such as near column bases and walls shall be sandblasted or mechanically wire brushed to remove all loose bond inhibiting materials. The prepared surface shall be primed within 72 hrs. after shotblasting. Any dirt, debris, or bond inhibiting material which accumulates on the ramp slab surface during this period shall be removed by means approved by Consultant.

.3 Remove projections and other conditions that may affect the installation of the coating.

.4 Fill pits, holes, and low spots with one part epoxy to four parts sand mixture. Allow epoxy to cure before applying topping.

.5 Rout or sawcut all cracks exceeding 1.5 mm in width and fill with sealant. Apply a 15 mil stretch coat of waterproofing membrane over routed and sealed joints.

.6 Clean prime and seal surfaces as recommended by traffic coatings manufacturer.

3.3 **INSTALLATION**

.1 Mix and install traffic coatings in accordance with reviewed shop drawings and manufacturer's written instructions.

.2 Stop traffic coatings in a straight line on each side of control/expansion joints. Fill control/expansion joint with sealant.

.3 Apply traffic coatings with care to ensure that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform colour, sheen and texture, all within limitations of materials and areas concerned.

.4 Make clean true junctions with no visible overlap between adjoining applications of traffic coatings.

.5 Chase edge of adjacent floor systems so that traffic coatings finishes flush with adjacent floor systems.

.6 Where required, prime concrete surfaces in accordance with manufacturer's written recommendations.

.7 Coordinate and work with plumbing Contractor's so that membrane is correctly installed.

.8 Provide integral flashings at all locations where a horizontal surface abuts a vertical surface and at all deck projections. Apply waterproofing membrane over prepared surfaces to a minimum dry film thickness of 760 microns (30 mils) and extend 150 mm minimum on vertical surfaces and 150 mm on horizontal surfaces.

.9 At projections through deck such as post, pipes, railings, vents and similar locations of potential movement, install a sealant bead and tool to form a cove and allow to cure prior to application of traffic coating.

.10 Cracks and joints greater than 1.5 mm in width shall be routed and filled with a joint sealant which is compatible with the waterproofing membrane, as per the manufacturer's recommendation. Apply a stretch coat of waterproofing membrane at a minimum dry film thickness of 380 microns (15 mils) for a distance of 150 mm each side of all visible cracks, (i.e. less than 1.5 mm) including cracks greater than 1.5 mm wide which have been routed and filled with a sealant.

.11 Apply waterproofing membrane over entire area to be waterproofed to a minimum dry film thickness as recommended by the membrane manufacturer, but shall not be applied to a dry film thickness less than 760 microns (30 mils). Apply waterproofing membrane material evenly over flashing and detail work. Allow waterproofing membrane to cure before proceeding with application of wearcourse in accordance with manufacturer's recommendations. At all interfaces where the waterproofing membrane is to tie-in with a hot rubberized asphaltic waterproofing system, the waterproofing membrane shall be installed first and allowed to cure prior to the installation of the hot applied waterproofing system.

.12 Traffic topping system membrane and wear course dry film thickness for the interior suspended parking slabs and ramps including the mechanical rooms and commercial area shall be as follows:

Location	Membrane Thickness (mils)	Wear Course Thickness (mils)	Top Coat Thickness (mils)	Total Thickness (mils)	Aggregate in Wear Course
Parking Stalls	30	20*	10*	60*	Minimum 5 kg/10 m² Partial Broadcast, Sand & Back roll
Drive Aisles	30	25*	10*	65*	Minimum 6 kg/10 m² Broadcast Heavy with Sand
Ramps	30	35*	10*	75*	Minimum 9 kg/10 m² Broadcast Heavy with Sand
Mechanical Rooms	30	20*	10*	60*	Minimum 5 kg/10 m² Partial Broadcast, Sand & Back roll Method
Commercial Area	30	35*	10*	75*	Minimum 9 kg/10 m² Broadcast Heavy with Sand

Note:
.1 * Thickness excludes the aggregate which will be broadcast in the wear coarse.
.2 Primer shall be used in accordance with the manufacturer's written specifications.

.13 Backroll wearcourse material into aggregate to ensure uniform finish. Allow wearcourse to cure prior to topcoating.

.14 Apply topcoat to a minimum dry mil thickness of 125 microns (5 mils).

3.4 **TRAFFIC MARKINGS**

.1 Spray paint parking zone lines and other traffic markings indicated, included, but not limited to, hash marks for no parking areas, direction arrows and handicap parking symbols.

.2 Use suitable compressor type striping machine. Use templates for symbols, arrows, lettering.

.3 Unless otherwise indicated, paint lines 125 mm wide.

.4 Paint lines straight, or uniformly curved, with well defined edges and full paint coverage in all locations. Colour of traffic markings to later selection of Consultant.

3.5 **REPAIR**

.1 Touch-up and refinish minor defective work. Refinish entire coated surface areas where finish is damaged or otherwise unacceptable.

3.6 **PROTECTION**

.1 Erect barriers to prevent the entry and presence of personnel not performing work of this Section during application of traffic coatings, and for 48 hours following completion of application.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for water repellent sealer Work in accordance with the Contract Documents.

.2 Water repellent sealer to be applied on concrete slabs on grade of parking garages and any additional areas as indicated.

1.2 **REFERENCES**

.1 ASTM C920, Specification for Elastomeric Joint Sealants.

.2 CSA S413, Parking Structures.

1.3 **DESIGN REQUIREMENTS**

.1 Design water repellant sealer for vehicular traffic in accordance with CSA S413.

1.4 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, limitations, preparation and installation requirements.
  - .2 Product transportation, storage, and handling requirements.

.2 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.3 Reports/Certificates:
- .1 Submit manufacturer's written acceptance of substrate prior to installation.
- .2 Submit applicator’s current certificate of approval, for installation of sealer, by the material manufacturer as proof of compliance.
- .3 Submit letter certifying that materials proposed for use on this project meet criteria specified, are compatible with each other, and that the manufacturer had recommended the product for it’s intended end use.
- .4 Submit inspection report after application of sealer.

.5 Submit certification from sealer manufacturer that installation meets specified and manufacturer's requirements.

.6 Submit a letter from the sealer manufacturer stating that the manufacturer will inspect the surface to which sealer has been applied, at the end of the first, third, and fifth years after application, and will submit a written report after each inspection to the Owner. The report shall state conditions that may adversely affect the sealer performance or cause water penetration, such as structural movement or defects, faulty construction or materials, and joint areas requiring resealing or repointing, and recommendations for corrective measures under the terms of the Warranty. This maintenance inspection shall be performed at no cost to the Owner.

.4 Closeout submittals: Submit maintenance data for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10.

1.5 QUALITY ASSURANCE

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in Work of similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.

.2 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.

.2 Store product in location protected from freezing, damage, construction activity, precipitation, and direct sunlight, in strict accordance with manufacturer's recommendations.

.3 Prior to application, condition products in accordance with manufacturer's recommendations.

.4 Handle all products with appropriate precautions and care as stated on Material Safety Data Sheet.

1.7 SITE CONDITIONS

.1 Do not install Work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:

.1 Ambient air and surface temperature: 5°C to 38°C

.2 Precipitation: None.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after installation.

1.8 **EXTENDED WARRANTY**

.1 Submit a extended warranty for the Work of this Section in accordance with General Conditions, except that warranty period is extended to five years from date of Substantial Performance of the Work.
- .1 Warrant against loss of water repellency when tested as follows:
  - .1 Modified ASTM C642 procedure: Treated concrete shall not absorb more than 0.75% water for a period of 24 hours.
  - .2 AASHTO T259: Concrete shall not absorb more than 250 ppm of chlorides at the 11/2 inch level over baseline conditions.
- .2 Coverage: Complete repair of defective areas and reapplication of sealer.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, primers, sealants, sealers, and paints are to have low VOC content limits.

.2 Water repellent sealer:
- .1 Underground parking: Clear, penetrating, water based, breathable, silane based sealer; ‘Protectosil BHN’ by DRE Industries Inc. or ‘Hydrozo 100' by BASF.
- .2 Exterior concrete: Clear, penetrating, water based, breathable, silane based sealer; ‘Aqua-Trete 40' by DRE Industries Inc. or ‘Enviroseal 40' by BASF.

.3 Sealant: ASTM C920, Type M, Grade P, Class 25; Two-part, self-levelling type, in standard colours selected.
- .1 Sikaflex - 2C-SL by Sika Canada Inc.
- .2 THC 900 with epoxy primer by Tremco Ltd.

.4 Primers: Type recommended by material manufacturers for various substrates, to promote adhesion and to prevent staining of adjacent surfaces for conditions encountered on project.

.5 Joint backing: Round, solid section, skinned surface, soft polyethylene foam gasket stock, compatible with primer and sealant materials, 30 to 50% oversized, Shore A hardness of 20, tensile strength 140 to 200 kPa. Bond breaker type surface.

.6 Bond breaker: Type recommended by material manufacturers to prevent bonding of sealant to back of recess.

.7 Cleaning agents: As recommended by material manufacturer, harmless to substrates and adjacent finished surfaces.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, and any other foreign matter detrimental to performance. Obtain manufacturer's approval of substrate in writing, submit copy to Consultant.

3.2 **PREPARATION**

.1 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from Work of this Section.

.2 Thoroughly clean all surfaces to receive sealer by steel shotblasting or other method approved by the manufacturer.

.3 Rout or sawcut all cracks exceeding 1.5 mm in width and fill with sealant.

3.3 **SEALER APPLICATION**

.1 Apply sealer in accordance with manufacturer's written instructions.

.2 Apply sealer without dilution or alteration in any way.

.3 Apply sealer with low pressure airless spray equipment (15 Psi) capable of flooding the surface to obtain uniform coverage and extending sealer 100 mm up walls.

.4 Apply sealer at a minimum application rate of 4.3 m^2/L.

.5 Apply sealer by method other than spray application only at locations where overspray would affect adjacent materials.

3.4 **SEALANT APPLICATION**

.1 Do not fill joints sooner than 30 days after concrete pours. Execute joint sealing during cool, dry ambient conditions when slab is in contracted state to minimize future joint separation.

.2 Comply with sealant manufacturer's primer, application and temperature requirements.

.3 Prior to sealant application, thoroughly dress and clean joints. Slightly abrade joints exposed to wheel traffic. Prime joint surfaces as required.

.4 Mask floor to edge of joints and fill joint with sealant. After initial set, prime sealant surface and refill joints with sealant as required to produce slightly convex joint surface.

.5 Apply sealant in tooled or sawn joints and at other locations indicated on drawings.

3.5 **FIELD QUALITY CONTROL**

.1 Immediately after sealing has been completed, have the sealer manufacturer's representative visit the site to inspect, test, and approve the application. Submit written inspection report to Consultant.

.2 Deficiencies in the application shall be repaired at no cost to Owner.

3.6 **PROTECTION**

.1 Prevent traffic over sealed areas, and protect Work of this Section from precipitation, freezing, and debris after installation.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for the thermal insulation Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM C518, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

.2 ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

.3 CGSB 71-GP-24M, Flexible Adhesive for Bonding Cellular Polystyrene Insulation.

.4 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.5 CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.6 CAN/ULC-S702, Mineral Fibre Thermal Insulation for Buildings.

.7 CAN/ULC-S704, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

.8 CAN/ULC S705.2, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Installers Responsibilities Specification.

1.3 **SUBMITTALS**

.1 Product data: Submit manufacturer's Product data in accordance with Section 01 10 10 indicating characteristics, performance criteria, and limitations. Indicate installation requirements and techniques, storage, and handling criteria and installation procedure acceptable to manufacturer.

.2 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.3 Certification: Submit installer's certification verifying compliance with specification requirements.

1.4 **QUALITY ASSURANCE**

.1 Qualifications: Execute Work of this Section by company specializing in thermal insulation Work with minimum of three years, recent, documented experience, on Work of comparable complexity and scope.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, adhesives are to have low VOC content limits.

.2 Batt Insulation: CAN/ULC-S702, Type 1, friction fit. Mineral Wool by Fibrex Insulations Inc. or Roxul. Thickness: As indicated on Drawings.

.3 Rigid insulation (exterior use only): CAN/ULC-S701, Type 4; Extruded polystyrene rigid board, ship-lapped edges. For adhesive and pin clip installation at perimeter foundation walls and additional locations as indicated. Thickness: As indicated on Drawings.
.1 'Styrofoam SM' by Dow Chemical Canada Inc.
.2 'Foamular C-300' by Owens Corning Canada Inc.

.4 Polyisocyanurate Rigid Insulation (interior only): CAN/ULC-S704; Type 2 or 3; rigid polyisocyanurate foam core board, faced each side with polymer-reinforced glass fibre or foil, pin-clip installation. Thickness: As indicated on drawings.
.1 'Thermax' by Dow Chemical Company.
.2 'Energy Shield' by Atlas Roofing.

.5 Acoustic Blanket Insulation: In accordance with Section 09 21 16.

.6 Semi-Rigid Acoustic Insulation: In accordance with Section 04 20 00.

.7 Semi-Rigid Mineral Insulation (exterior only): CAN/ULC-S702; Type 1; semi-rigid mineral wool, unfaced, pin-clip installation, density 65 kg/m^3. Thickness: As indicated on drawings.
.1 'Fibrex Cavity Wall Insulation (CWB 45)' by Fibrex Insulations Inc.
.2 Or approved alternative.

.8 Semi-rigid mineral insulation (interior at outside walls only): Conforms to ASTM C518 for thermal resistance; semi-rigid mineral wool, unfaced, friction fit, pin-clip installation, density 64 kg/m^3. Thickness: As indicated on drawings.
.1 'Thermafiber FS-15' by Thermafiber Incorporated (as supplied by CertainTeed Corporation Canada).
.2 'Rockboard' by Roxul Incorporated.

.9 Semi-Rigid Thermal Insulation (interior only): ASTM C612, Type 1A, semi-rigid inorganic fibres (either glass or mineral) with a thermosetting resin binder, reinforced white facing only where required, pin-clip installation, minimum density 96 kg/m^3. Thickness: As indicated on drawings.
- .1 'Thermafiber Versaboard 40' by Thermafiber Incorporated (as supplied by CertainTeed Corporation Canada).
- .2 'Insul-SHIELD' by Johns Manville.
- .3 Or approved alternative that exhibits the same or better performance as either of the above preferred materials.

.10 High density under slab insulation: CAN/ULC S701, Type 4, closed cell extruded expanded polystyrene sheets in thickness as indicated on drawings. Insulation to have a compressive strength of 415 kPa. ‘Styrofoam Highload 60' by Dow Chemical Canada or ‘Foamular 600' by Owens Corning Canada Inc.

.11 Spray Foam Insulation: CFC free, polyurethane foam-in-place, closed cell, two-component, minimum density 28 kg/m^3.
- .1 'FROTH-PAK' by Dow Chemical Canada.
- .2 Or approved alternative by Rivenco Industries.

.12 Spray Foam Insulation: CAN/ULC-S102.1 and CAN/ULC-S102.2, CFC free, polyurethane foam-in-place, closed-cell low expansion, one-component, minimum density 15 kg/m^3.
- .1 'ENERFOAM' by Dow Chemical Canada.
- .2 'IPF All Weather Pro' by Rivenco Industries.
- .3 ‘PURfectseal’ by NUCO Inc.

.13 Adhesive for polystyrene insulation: CGSB 71-GP-24M, Type 2, Class A, and approved by air/vapour barrier manufacturer when adhesive is in direct contact with air/vapour barrier membrane.

.14 Pressure sensitive tape: Pressure sensitive tape having adhesive compatible with facing surface and fabricated from a material that matches the performance criteria and surface of the facing material. Type as recommended by facing manufacturer.

.15 Insulation clips: Stic-Klip by Eckel Industries of Canada Ltd., with self locking type washers or equivalent by Continental Steel Stud.

.16 Clip adhesive: High strength, resilient PVC adhesive having drying time of 0 to 30 minutes (rapid initial set) and 24 hours final set, compatible with insulation adhesive, insulation air barrier and substrate, non-corrosive to galvanized steel, 311 N minimum holding strength at 3 day cure.

.17 Drainage board: In accordance with Section 33 46 13.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Ensure substrate surfaces are dry, clean, suitable to receive adhesive and free from other deleterious substances.

3.2 **INSTALLATION**

.1 Install thermal insulation in longest blanket and panel sizes possible in accordance with manufacturer's instructions.

.2 Butt insulation with moderate contact and, cut and fit them tightly around other construction elements. Offset single layer vertical joints and both vertical and horizontal joints in multiple layer applications.

.3 Make thermal insulation continuous, maintain thermal protection continuity and secure to prevent displacement. Ensure that insulation is tight to substrate without air gaps.

.4 Cut and fit thermal insulation tightly around electrical boxes, plumbing and heating pipes and ducts, exterior doors and windows, and other protrusions.

.5 Leave 75 mm separation between thermal insulation and heat emitting devices such as recessed light fixtures.

.6 Cut and trim thermal insulation neatly to fit spaces; do not excessively compress insulation to fit. Install only thermal insulation boards which are free from chipped or broken edges.

.7 Pack miscellaneous cavities with insulation to maintain continuity of thermal barrier.

.8 Arrange for Consultant to review thermal insulation before it is enclosed.

.9 Batt insulation: Install batt insulation in partitions, between steel studs, and as indicated on Contract Drawings and in accordance with the manufacturer's instructions. Fill stud cavities to full height of partitions and carefully cut and fit batt insulation around services and protrusions.

3.3 **SECUREMENT**

.1 Rigid insulation (Adhesive attachment):
  .1 Apply adhesive to thermal insulation foam boards in accordance with manufacturer's recommendations.

.2 Omit adhesive bonding of foam board insulation over expansion and control joints.

.2 Mechanical Fastening (Stic-Klip):
- .1 Install insulation by adhesive clip method in accordance with manufacturer's specifications.
- .2 Locate clips 100 mm from edges of panels where they abut other materials and at joints between panels otherwise, spaced throughout at 300 mm to 450 mm centres each way.
- .3 At clip locations clean supporting surfaces and apply 50 mm square film of adhesive; coat clips with adhesive and press firmly to wall, holding in place until adhesive exudes through clip base perforations; remove excess adhesive to permit curing; impale insulation panels on clips and secure.
- .4 Apply compatible pressure sensitive tape over butt joints of all insulation having an integral vapour barrier.

.3 Perimeter foundation insulation:
- .1 Exterior application: unless otherwise indicated, extend boards to top of footing. Install on exterior face of perimeter foundation wall with clips and adhesive. Protect entire face of insulation exposed to backfill with drainage board. Terminate drainage board 100 mm below finish grade level.

.4 Foamed-in-place: Except where otherwise specified in other Sections, install foamed-in-place insulation fully in crevices to prevent air infiltration in accordance with manufacturers written instructions and CAN/ULC S705.2.

.5 Vibration isolator boards:
- .1 Install insulation boards in locations shown in accordance with manufacturer’s instructions.
- .2 Protect insulation board from damage by placing 200 mm layer of 19 mm crusher-run limestone over insulation board.
- .3 In drainage trenches, place insulation board to size and location as shown in Contract Drawings, with joints butted tight.

.6 High density underslab insulation:
- .1 Install insulation boards in locations shown in accordance with manufacturer’s instructions.
- .2 Place insulation board to size and location as shown in Contract Drawings, with joints butted tight.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, tools, equipment and services necessary for exterior insulation and finish system (EIFS) Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM B117, Test Method of Salt Spray (Fog) Testing.

.2 ASTM C67, Method of Sampling and Testing Brick and Structural Clay Tile.

.3 ASTM C920, Specification for Elastomeric Joint Sealants.

.4 ASTM D968, Test Method for Abrasion Resistance of Organic Coatings by the Falling Abrasive.

.5 ASTM E695, Method for Measuring Relative Resistance of Wall, Floor, and Roof Constructions to Impact Loading.

.6 CAN/CGSB-1.162, Stucco and Masonry Coating, Emulsion Type.

1.3 **SYSTEM DESCRIPTION**

.1 Provide a complete drained exterior insulation and finish system consisting but not limited to the following components: Metal flashings, vapour retarder, drainage layer, mechanically fastened insulation, reinforcing fabric, base coat, drained joint system, and finish coat.

1.4 **DESIGN REQUIREMENTS**

.1 Design EIFS to withstand live, dead, lateral, wind, seismic, handling, imposed and other loads.

.2 Design EIFS assembly and panel design shall meet the provision of the Ontario Association of Architects (OAA) Wall Exclusions and Endorsements.

.3 Design EIFS to accommodate expansion and contraction of system elements without causing buckling, failure of joints, undue stress on fasteners or other effects detrimental to appearance or performance.

.4 Design EIFS to conform to the following performance properties:
   .1 Abrasion resistance, falling sand method to ASTM D968, no deleterious effects.
   .2 Salt spray resistance to ASTM B117, after 1000 hours exposure to 5% salt spray solution - no effects.

.3 Freeze-thaw resistance: to ASTM C67, 50 cycles of 20 hours of freezing at -9°C and 4 hours of thawing in water at 24°C +/- 6°C, no visible damage, negligible weight gain.
.4 Accelerated weathering: to CAN/CGSB-1.162, 2000 hours - no effect.
.5 Impact resistant to ASTM E695, 13.6 kg. weight, twelve impacts, pendulum swing from 152 mm to 1800 mm, drop heights at 152 mm increments.
.6 Bond strength: to CAN/CGSB-1.162.
.7 Permeability to CAN/CGSB-1.162.

1.5 **SUBMITTALS**

.1 Product data:
.1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
.1 Performance criteria, compliance with appropriate reference standard, characteristics, and system limitations.
.2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
.1 Submit shop drawings in accordance with Section 01 10 10 indicating:
.1 Wall layout, elevations, details, sections, dimensions, tolerances, connections, terminations, expansion and control joints, reveals, drained joints, finish system, installation sequence, including interface with doors, windows, and other components, edge treatment at discontinuous edges of insulation, and accessories and other pertinent information required for proper and complete installation.
.2 Complete design data to confirm that EIFS meet design requirements specified.

.3 Samples: Submit two 300 x 300 mm samples of complete EIFS and of each colour of finished wall system in accordance with Section 01 10 10.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
.1 Indicate cost, post consumer and pre-consumer recycled content for each product.
.2 Identify each regionally extracted and manufactured material, its source and cost.
.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.5 Reports: Submit written inspection reports within 5 working days after each inspection.

.6 Closeout submittals: Submit maintenance and cleaning instructions for EIFS for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10.

1.6 QUALITY ASSURANCE

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience installing EIFS of similar size and nature and that is approved by system manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.

.2 EIFS manufacturer shall conduct Site inspections for on site verification of installation procedures and methods during the installation of EIFS system and shall prepare and submit written inspection reports. Perform inspections after installation of the air/vapour retarder, installation of base coat and at completion of EIFS system. All associated costs of these inspections are the responsibility of the Contractor.

.3 Mock-up:
- .1 Construct one 10 m^2 mock-up minimum of EIFS in location acceptable to Consultant.
- .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
- .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.

.4 Pre-installation meeting: Arrange with manufacturer's representative, EIFS Subcontractor, and Consultant to inspect substrates, review installation procedures and site specific details minimum 48 hours in advance of installation.

1.7 SITE CONDITIONS

.1 Do not install Work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
- .1 Ambient air and surface temperature: 5^0C to 35^0C
- .2 Precipitation: None.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after installation.

.3 Do not proceed with application of materials immediately prior to, during or immediately after inclement conditions, or if wet weather is anticipated within 24 hours after application. Do not apply materials to wet, frozen, or frosted surfaces.

.4 Protect applied coatings from rapid evaporation during dry and hot weather.

1.8 **EXTENDED WARRANTY**

.1 Provide a extended single source warranty for EIFS Work in accordance with the General Conditions, except that the warranty period is extended to 5 years from date of Substantial Performance of the Work.

.1 Warrant against failure to meet the design criteria and requirements such as failure to stay in place (both insulation and lamina), failure to drain cavity and joints, peel, flake, chip, cracking, warping, leakage, finish degradation, and sealant failure.

.2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **ACCEPTABLE SYSTEMS AND MANUFACTURERS**

.1 This specification is written on the basis of a DuRock PUCCS exterior insulation and finish system. Specified manufacturer's products establish the minimum acceptable standards for the work of this Section. EIFS systems of other manufacturer's shall exceed specified manufacturer's standards.

2.2 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, adhesives, coatings, sealants, primers, and sealers are to have low VOC content limits.

.2 Water: Potable.

.3 Metal flashings: In accordance with Section 07 62 00.

.4 Flexible flashings: 1.0 mm thick, single-ply, self adhering, self sealing, rubberised asphalt, bonded to a cross-laminated high density polyethylene film compatible with air retarder adhesive and EIFS system.

.5 Air/moisture barrier and adhesive: 100% acrylic emulsion mixed with portland cement. DuRock Cement Bear.

.6 Semi-rigid mineral insulation: CAN/ULC-S702, Type 2, Class 4; semi-rigid mineral wool board, minimum density 96 kg/m3, minimum RSI value of 0.71 per 25 mm, concealed plane of insulation is to be grooved to facilitate drainage. Thickness: As indicated on drawings.

.7 Foam insulation: One component polyurethane foam; Enerfoam by Dow Chemical Canada Inc.

.8 Fasteners (sheathing board substrate): High density plastic washers, 50 mm diameter heads with corrosion resistant screws. Wind-Devil 2 by Wind-Lock Corporation.

.9 Reinforcing mesh: balanced, open weave, glass fibre fabric made from twisted multi-end strands, treated, alkali resistant, heavy-duty and high-impact resistant. Use heavy-duty high-impact resistant mesh in locations indicated on drawings.

.10 Base coat: Water-based acrylic based cementitious coating system of Portland cement, silica sand aggregate, acrylic liquid admixture, colour grey. DuRock Prep Coat.

.11 Primer coat: Acrylic based primer tinted to match finish coat. DuRock Base Primer.

.12 Finish coat: Waterproof, air cured, self bonding acrylic resin plaster material containing silica aggregate, integral mineral pigmentation and additives, colours: As indicated on Exterior Finish Schedule.

.13 Vent strip: Pre-coloured polyvinyl chloride extrusion. DuRock Uni-Track.

.14 Sealant and sealant primer: ASTM C920, Type S, Grade NS; 'Dow Corning 790' by Dow Coring Corporation or 'Spectrem 3' by Tremco Limited complete with primer recommended by manufacturer.

.15 Joint filler: extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 - 200 kPa, outsized 30 to 50%.

2.3 **MIXES**

.1 Measure and batch materials by either volume or weight only, to accurately control and maintain proportions. Mix and prepare materials in accordance with manufacturer's written instructions.

.2 Do not add any additional additives, rapid binders, antifreeze, accelerators, fillers or pigments without the written approval of the EIFS manufacturer and Consultant.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, and other foreign matter detrimental to performance. Ensure environmental and site conditions are suitable for installation of system.

.2 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from Work of this Section.

.3 Prepare surfaces in accordance with manufacturer's written instructions.

.4 Protect finished work at end of each day or on completion of each section of work from water penetration. Protect top of walls, and openings until flashings and trim are installed. Protect completed installation from moisture for 48 hours minimum.

3.3 **FLASHINGS**

.1 Install flexible flashings at all openings and penetrations in substrate and in locations indicated to drain any moisture entering the EIFS system to the exterior. Install flexible flashing in accordance with manufacturer’s written instructions.

.2 Install metal flashings in locations indicated in accordance with Section 07 62 00. Fasten flashings to substrate at 450 mm o.c. minimum.

3.4 **AIR/MOISTURE BARRIER AND ADHESIVE**

.1 Prior to installation, tape and seal all joints in substrate with air/moisture barrier and mesh reinforcing prior to installation of air/moisture barrier.

.2 Install minimum 1.6 mm air/moisture barrier in accordance with manufacturer’s written instructions and allow to dry.

.3 Install second coat of air/moisture barrier with notched trowel and apply insulation into air/moisture barrier while still wet.

.4 Do not start installation of insulation until air retarder/adhesive has been inspected and approved in writing by inspection and testing agency approved by EIFS manufacturer.

3.5 **INSULATION**

.1 Install insulation into air/moisture barrier in running bond pattern with long edge oriented horizontally. Stagger and interlock edges at corners. Butt joints tight except at control joints. Pre-cut to fit openings, corners and projections prior to installation.

.2 Check surface planeness of installed boards. Machine sculpture insulation to profiles shown. Sand high areas and out-of-plane board edges flush, smooth and level.

.3 Provide reveals in insulation boards as indicated. Ensure reveals are true to size and straight and level throughout. Ensure all reveals are in accurate alignment over entire wall surface.

.4 Fill all gaps in insulation boards and around projections with foam insulation.

3.6 **VENT STRIP**

.1 Install vent strip at bottom of EIFS system to provide free draining 25 mm wide strip. Block out standard reinforcing fabric and corner mesh prior to applying base and scratch coats.

3.7 **FINISH SYSTEM**

.1 Install EIFS in accordance with reviewed shop drawings and manufacturer's written instructions. Comply with system manufacturer's requirements regarding terminations at end of each days work and resumption of work.

.2 Install starter strips behind insulation boards and returning onto the face of insulation boards.

.3 Install reinforcing mesh to cover full extent and height of previously installed starter strips and balance of insulation. Apply mesh to be continuous at corners, along both edges of expansion/control joints, with fabric end and edge joints lapped 100 mm minimum.

.4 At discontinuous insulation board edges, terminate fabric along line even with bottom of insulation board.

.5 Apply base coat to a minimum total dry film thickness of 1.6 mm continuously over insulation. Maintain wet edge and avoid cold joint or staging marks. Embed the reinforcing mesh into the base coat. Ensure that trowelling process fills all voids in the fabric.

.6 Apply a second base coat once first base coat has dried to obtain an overall base coat thickness of not less than 3 mm.

.7 Final surface shall be smooth, straight and true to a tolerance of not more than 3 mm in 3000 mm. Surface shall be free of trowel marks, irregularities and visible mesh pattern.

.8 Allow 24 hours minimum for curing and drying, protect base coat from contamination and other damage detrimental to system appearance and performance.

.9 Do not start installation of EIFS finish coat or any other interfacing construction (ie. Aluminum Work) until base coat has been inspected, including wrap at all jambs, sills and headers and approved in writing by inspection and testing agency approved by EIFS manufacturer.

.10 Prior to installation of finish coat, prime and seal joints at abutting building components, at expansion/control joints, and at through wall flashings with specified sealant in accordance with manufacturer's instructions. Sealing of finish coat will not be accepted. Leave 25 mm gaps in sealant at through wall flashings at 600 mm o.c.

.11 Apply primer and finish coat continuously in one operation with levelling and texturing occurring simultaneously. Maintain wet edge and avoid cold joints or staging marks. Achieve final colour and texture free from defects detrimental to appearance and performance to match accepted sample.

.12 Protect finish coat from weather, contaminants, and other damage detrimental to system appearance and performance.

3.8 **CONTROL JOINTS**

.1 Unless otherwise indicated on drawings, install 12.7 mm control joints to divide wall area into maximum 20 m² panels with maximum 10 m horizontally and 3 m vertically in any direction, at dissimilar substrates, and at masonry wall joints as indicated on drawings.

.2 Caulk all control joints and joints between EIFS system and adjacent construction in accordance with manufacturer's written instruction.

3.9 **CLEANING**

.1 Clean any spots or blemishes from surface of work and leave system in clean condition. Re-apply stucco finish to damaged surfaces only if approved by Consultant, and to no additional cost to the Owner.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for air/vapour retarders Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CAN/CGSB 19.21-M, Sealing and Bedding Compound, Acoustical.

.2 CAN/CGSB-51.34-M, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Samples: Submit following samples in accordance with Section 01 10 10:
- .1 Two 300 x 300 mm samples of vapour retarders.
- .2 Two samples, 300 mm long, of fastening bar.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.4 **QUALITY ASSURANCE**

.1 Mock-up:
- .1 Construct one 10 m^2 mock-up of each type vapour retarder in location acceptable to Consultant indicating as a minimum one lap joint, one inside corner, one window interface, and one electrical box.
- .2 Arrange for Consultant's review and acceptance.
- .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.5 **SITE CONDITIONS**

.1 Do not install the Work of this Section outside of environmental ranges as recommended by manufacturer without Consultant's and Product manufacturer's written acceptance.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements before, during, and after installation.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.

.2 Membrane air/vapour retarder: 1.0 mm thick, single-ply, self adhering, self sealing, rubberised asphalt, bonded to a cross-laminated high density polyethylene film. Provide high temperature peel and stick air/vapour membrane for use at all window sills and any additional areas as indicated.
- .1 ‘CCW 705' by Carlisle Coatings & Waterproofing.
- .2 ‘Sopraseal Stick 1100 T' by Soprema.
- .3 ‘Exo-Air 110' by Tremco.
- .4 ‘Air-Shield” by W. R. Meadows.

.3 Primer:
- .1 ‘CCW-AWP Primer' by Carlisle Coatings & Waterproofing.
- .2 ‘Elastocol Stick' by Soprema.
- .3 ‘ExoAir Primer’ by Tremco
- .4 ‘Mel-Prime Water Base’ by W.R. Meadows.

.4 Mastic:
- .1 ‘CCW 704 Mastic’ by Carlisle Coatings & Waterproofing.
- .2 ‘Sopramastic' by Soprema.
- .3 ‘Acoustical Sealant’ by Tremco
- .4 ‘Sealtight Pointing Mastic' by W.R. Meadows.

.5 Fastening bar: Continuous 25 mm wide x 3 mm thick aluminum bar, predrilled for mechanical attachment.

.6 Fasteners: As specified herein or manufacturer’s recommended fastener for attaching to Substrate.

.7 Sheet vapour retarder ‘Super Six' Polyethylene film to CAN/CGSB-51.34, 0.15 mm (6 mil) thick.

.8 Joint sealing tape: Air resistant pressure sensitive adhesive tape, type recommended by sheet vapour retarder manufacturer, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.

.9 Sealant: CAN/CGSB 19.21; One-part, non-sag, non-bleeding, non-drying, non-hardening, sealant shall remain tacky for permanent bonding to all surfaces; 'Tremco Acoustical Sealant' by Tremco Ltd. or approved alternative.

.10 Foil faced vapour retarder:
- .1 28 mil thick heavy gauge foil vapour retarder with natural kraft backing and reinforcing fibreglass mesh strands.
- .2 'Sauna Foil Vapor Barrier' by Saunas And More or approved alternative.
- .3 Tape: Pressure sensitive tape aluminum foil as recommended by foil vapour retarder for complete and water tight installation.

3 Execution

3.1 **EXAMINATION AND COORDINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Verify that existing substrates to receive vapour retarder are clean, dry, sound, smooth, and continuous.

.3 Coordinate installation of vapour retarders with work of other Sections to achieve a vapour tight building envelope.

3.2 **SHEET VAPOUR RETARDER INSTALLATION**

.1 Ensure services are installed and inspected prior to installation of retarder.

.2 Install sheet vapour retarder on the warm side of exterior wall, roof, and ceiling assemblies, prior to installation of roof insulation or interior finishes to form a continuous vapour retarder.

.3 Use sheets of largest practical size to minimize joints.

.4 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

.5 At exterior surface openings, cut vapour retarder to form openings and ensure material is lapped and sealed to frame.

.6 Ensure continuity of vapour retarder is maintained at junctures with other materials.

.7 At perimeter seals, seal perimeter of sheet vapour retarder as follows:
- .1 Apply continuous bead of sealant to substrate at perimeter of sheets.
- .2 Lap sheet over sealant and press into sealant bead.
- .3 Install fasteners through lapped sheets at sealant bead into substrate.
- .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

.8 Seal lap joints of sheet vapour retarder as follows:
- .1 Attach first sheet to substrate.
- .2 Apply continuous bead of sealant over solid backing at joint.
- .3 Lap adjoining sheet minimum 150 mm and press into sealant bead.
- .4 Install fasteners through lapped sheets at sealant bead into substrate.
- .5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

.9 Seal electrical switch and outlet device boxes that penetrate vapour retarder as follows:
- .1 Wrap boxes with film sheet providing minimum 300 mm perimeter lap flange.
- .2 Apply sealant to seal edges of flange to main vapour retarder and seal wiring penetrations through box cover.

3.3 MEMBRANE VAPOUR RETARDER INSTALLATION

.1 Install vapour retarder and associated components in accordance with manufacturer's instructions in locations indicated.

.2 Mastic and primer:
- .1 Install mastic where required to ensure integrity of vapour retarder installation at protrusions and other complex details.
- .2 Fill substrate voids, gaps, depressions, cracks, and joints with mastic until continuous, smooth, substrate for vapour retarder is achieved.
- .3 Prime substrate surfaces to receive vapour retarder, at recommended application rate, allow to dry. Vary coverage to suit surface porosity.
- .4 Prime surfaces. Re-prime surfaces if not covered with vapour retarder within 4 hours.

.3 Lap vapour retarder ends and edges 50 mm minimum. Roll vapour retarder and laps for continuous adhesion over entire substrate area; use manufacturer's recommended roller.

.4 Extend vapour retarder as required to connect to roof parapets, windows, doors frames, aluminum work and other components of Work comprising vapour retarder system.

.5 Cut and fit vapour retarder as required for passage of protrusions, ensuring continuous adherence to substrate.

.6 At end of days' Work, trowel mastic water cut-off along uppermost edge of incomplete vapour retarder assembly, to prevent loss of adhesion and damage vapour retarder.

.7 Supply and install continuous mechanical fastening bar to clamp vapour retarder both sides of unfilled gaps, cracks, and joints.

3.4 **FOIL VAPOUR RETARDER**

.1 Ensure services are installed and inspected prior to installation of retarder.

.2 Install foil vapour retarder at steam room locations as indicated to form a continuous vapour retarder.

.3 Use sheets of largest practical size to minimize joints.

.4 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

.5 Ensure continuity of foil vapour retarder is maintained at junctures with other materials.

.6 Apply compatible pressure sensitive tape over joints of foil vapour retarder.

3.5 **FIELD QUALITY CONTROL**

.1 Inspect vapour retarder continuity immediately prior to installation of subsequent construction. Repair punctures, rips and tears to ensure continuity of vapour retarder.

.2 Where punctures and tears are extensive, replace entire damaged section.

.3 Do not cover or permit to be covered any portion of vapour retarder until it has been inspected by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products equipment and services necessary for vapour permeable air barrier Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM C920, Specification for Elastomeric Joint Sealants.

1.3 **SUBMITTALS**

.1 Product data: Submit manufacturer's Product data in accordance with Section 01 10 10 indicating installation details, physical properties and detailed application and installation instructions.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Adjacent construction and typical details, dimensions, thickness, method of application, protection and penetration details.
  - .2 Location of each membrane penetration.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certification:
- .1 Submit installer's certification verifying compliance with specification requirements.
- .2 Submit applicator’s current certificate of approval by the material manufacturer that they are approved to install specified projects.

1.4 **QUALITY ASSURANCE**

.1 Qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer.

.2 Mock-up:
- .1 Construct one 10 m2 mock-up of air barrier in location acceptable to Consultant.

.2 Demonstrate verify details, tie-ins and to demonstrate the required quality of materials and installation.
.3 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
.4 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
.5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

.3 Pre-installation meeting:
.1 Minimum 48 hours in advance of installation, arrange a meeting with manufacturer's representative, Consultant and all Subtrades affected by the work of this Section. Agenda should include but not be limited to the following:
.1 Review of submittals.
.2 Review of surface preparation, minimum curing period and installation procedures.
.3 Review of special details and flashings.
.4 Sequence of construction, responsibilities and schedule for subsequent operations.
.5 Review of inspection, testing, protection and repair procedures.

1.5 **SITE CONDITIONS**

.1 Do not install the Work of this Section outside of following environmental range without Consultant's and Product manufacturer's written acceptance:
.1 Ambient air and surface temperature: 50C to 380C.
.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements before, during, and after installation.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.

.2 Primer: ‘Aquatac Primer' by Henry Company Canada Inc. or approved alternative.

.3 Sealant: ASTM C920, Type S, Grade NS, Class 25; Moisture sure, medium modulus polymer modified sealing compound ‘HE925 BES’ by Henry Company Canada Inc. or approved alternative by Tremco or W.R. Meadows.

.4 Vapour permeable air barrier: 0.48 mm thick, single-ply, self adhering vapour permeable, water resistive air barrier membrane consisting of an engineered film and patented, permeable adhesive technology with split-back poly-release film; ‘BlueskinVP 100’ by Henry Company Canada Inc. or approved alternative.

.5 Fastening bar: Continuous 25 mm wide x 3 mm thick aluminum bar, predrilled for mechanical attachment.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 New concrete should be cured for a minimum of 14 days and must be dry before air barrier installation.

.3 Verify that existing substrates to receive air barrier are clean, dry, sound, smooth, continuous, sound and free of voids, spalled areas, loose aggregate, and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods that are acceptable to air barrier manufacture.

.4 Coordinate sealing of interruptions in, and protrusions through air barrier. Verify that other Work items projecting through air barrier are in place and are securely installed.

3.2 **MASTIC AND PRIMER**

.1 Fill substrate voids, gaps, depressions, cracks, and joints with mastic until continuous, smooth, substrate for air barrier is achieved.

.2 Prime substrate surfaces to receive air barrier in accordance with manufacturer's instructions, at recommended application rate, allow to dry. Vary coverage to suit surface porosity.

.3 Prime surfaces. Re-prime surfaces if not covered with air barrier within 4 hours.

3.3 **APPLICATION**

.1 Install mastic where required to ensure integrity of air barrier installation at protrusions and other complex details.

.2 Install air barrier in accordance with reviewed shop drawings and manufacturer's instructions in locations indicated.

.3 Lap air barrier ends and edges 50 mm minimum. Roll air barrier and laps for continuous adhesion over entire substrate area; use manufacturer's recommended roller.

.4 Extend air barrier as required to connect to other components of Work comprising air barrier system.

.5 Cut and fit air barrier as required for passage of protrusions, ensuring continuous adherence to substrate.

.6 Seal around masonry reinforcing or ties and all penetrations with termination mastic.

.7 At end of days' Work, trowel mastic water cut-off along uppermost edge of incomplete air barrier assembly, to prevent loss of adhesion and damage air barrier.

.8 Do not expose air barrier to sunlight for more than 30 days prior to enclosure.

3.4 **FASTENING BARS**

.1 Supply and install continuous mechanical fastening bar to clamp air barrier both sides of unfilled gaps, cracks, and joints.

3.5 **REPAIR**

.1 Inspect installation prior to enclosing and repair punctures, damaged areas and inadequately lapped seams with a patch of the air barrier sized to extend 150 mm in all directions from the perimeter of the affected area.

.2 Repair misaligned or inadequately lapped seams, punctures, or other damage with additional ply of air barrier sized to extend 150 mm minimum in all directions from repair edge.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, tools, equipment and services necessary for exterior soffit system Work complete in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.2 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 **DESIGN REQUIREMENTS**

.1 Design soffit system to accommodate expansion and contraction of soffit elements without causing buckling, failure of joints, undue stress on fasteners or other effects detrimental to appearance or performance.

1.4 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and system limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Details, sections, dimensions, tolerances, connections, terminations, control joints, system components, installation sequence, accessories and other pertinent information required for proper and complete installation.
  - .2 Complete design data to confirm that soffit system meet design requirements specified.

.3 Samples: Submit two 300 x 300 mm samples of complete soffit system in accordance with Section 01 10 10.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.

.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.5 Reports: Submit written inspection reports within 5 working days after each inspection.

.6 Closeout submittals: Submit maintenance and cleaning instructions for soffit system for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10.

1.5 QUALITY ASSURANCE

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience installing work of similar size and nature and that is approved by system manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.

.2 Soffit system manufacturer shall conduct Site inspections, prepare and submit written inspection reports verifying that this part of Work is in accordance with Contract Documents and reviewed shop drawings. Perform inspections once per week minimum.

.3 Mock-up:
- .1 Construct one 3000 mm minimum mock-up of soffit system in location acceptable to Consultant.
- .2 Arrange for Consultant's review and acceptance.
- .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.6 SITE CONDITIONS

.1 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after installation.

.2 Do not proceed with application of materials immediately prior to, during or immediately after inclement conditions, or if wet weather is anticipated within 24 hours after application. Do not apply materials to wet, frozen, or frosted surfaces.

1.7 EXTENDED WARRANTY

.1 Submit a extended warranty for soffit system work in accordance with the General Conditions, except that the warranty period is extended to 5 years from date of Substantial Performance of the Work.
- .1 Warrant against failure to meet the design criteria and requirements such as failure to stay in place, cracking, warping, and finish degradation.
- .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, coatings, sealants, primers, and sealers are to have low VOC content limits.

.2 Aluminum panels: ASTM B209, minimum 3 mm thick. Finish exposed surfaces of aluminum components as PPG Duranar XL Plus, 3 coat, coil coated fluoropolymer thermal setting enamel containing Kynar 500 resin, meeting requirements of AAMA 605, minimum thickness 2.4 mil, colour: to be determined. Concealed aluminum finish: Mill finish.

.3 Accessories: Hot-dip galvanized in accordance with CAN/CSA-G164-M, in locations shown on Contract Drawings.

.4 Fasteners: Provide type 304 stainless steel fasteners.

.5 Soffit vents: 115 mm wide continuous, high impact, rigid, polyvinyl chloride type soffit vent with continuous insect screen, `AMBICO AMSV-300-50' by AMICO Canada Inc., or`Vinyltech Item No. 548-50' by Plastic Components Inc., or approved alternative.

.6 Sealant and sealant primer: In accordance with Section 07 92 00.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, and other foreign matter detrimental to performance. Ensure environmental and site conditions are suitable for installation of system.

.2 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from Work of this Section.

.3 Prepare surfaces in accordance with manufacturer's written instructions.

.4 Protect finished work at end of each day or on completion of each section of work from water penetration. Protect completed installation from moisture for 48 hours minimum.

3.3 **SOFFIT SYSTEM**

.1 Install soffit system in accordance with reviewed shop drawings and manufacturer's written instructions. Comply with system manufacturer's requirements regarding terminations at end of each days work and resumption of work.

.2 Install continuous soffit vents in soffits as indicated on drawings to provide ventilation of concealed soffit spaces in accordance with OBC requirements.

3.4 **CONTROL JOINTS**

.1 Install 12.7 mm control joints at the following locations:
- .1 Soffit abuts a structural element, dissimilar wall or other vertical penetration.
- .2 Construction changes within the plane of the soffit.
- .3 Ceiling or soffit dimensions exceed 15 m in either direction.
- .4 Locations indicated on drawings.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for green roof system Work in accordance with the Contract Documents.

.2 Coordination with the work of Section 07 56 00 for roof installation and scheduling.

1.2 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Systems, materials, and methods of installation proposed for use, showing system and each component. Certify compliance of each component with applicable standards.
  - .2 Submit cold weather construction procedures and methods of protection which will be initiated, installed and maintained when ambient temperature falls below 0^0C.

.2 Shop drawings: Submit shop drawings indicating details of connections, layout, types of plantings and similar items in accordance with Section 01 10 10.

.3 Samples:
- .1 Submit following samples in accordance with Section 01 10 10.
  - .1 Planting green roof system complete with type of planting mix required.
  - .2 Metal edging.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.5 Project close-out submittals:
- .1 Submit close-out submittals in accordance with Section 01 10 10.
- .2 Submit maintenance guidelines and most current data sheets.

1.3 QUALITY ASSURANCE

.1 Installer Qualifications: Perform Work of this Section by a company specializing in installing and planting of green roof systems with a minimum of 5 years proven acceptable experience on installations of similar complexity and scope.

.2 Nursery Qualifications: Company specializing in growing and cultivating of plants with a minimum 10 years of documented experience, approved by Consultant.

.3 Maintenance Services: Perennial and groundcover maintenance must be performed by a certified horticulturalist.

.4 Verification of Structural Capacity: Prior to ordering products obtain written confirmation from owner-mandated professional engineer certifying that structure is capable of bearing additional load of green roof system.

.5 Vegetation guarantee: Provide written statement from manufacturer guaranteeing a minimum of 95% vegetated coverage at time of installation pre-planted 10 weeks prior to installation on roof.

.6 Pre-installation meetings: Arrange meeting on Site to be attended by Consultant, Contractor, and roofing manufacturer's representative to inspect substrates, and to review installation procedures 48 hours in advance of installation.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Pre-cultivated plant material shall be delivered in such a manner as to preserve quality of plants (e.g. refrigerated container).

.2 Upon arrival to site, trays shall be immediately removed from delivery truck and utilized on roof on same day. If roof is not sufficiently prepared for installation of tray, then prepare holding area to store trays without being stacked.

.3 Non-living components (root barrier, drainage, and fleece) can be stored on site, but must be protected from the elements by covering with a water-resistant tarpaulin.

1.5 EXTENDED WARRANTY

.1 Submit a extended written warranty for green roof system in accordance with the General Conditions, except that warranty period is extended to 2 years from date of Substantial Performance of the Work.

.2 Plants shall be in healthy growing condition by end of warranty period. Plants with dead or dying branches, which in the opinion of the Consultant are sufficient to detract from the character and form of the plant, will not be accepted. Replacements required during warranty period shall be plants of the same kind and size as shown on the plant list and on the drawings, furnished and planted as specified in the Contract Documents. The cost of replacement shall be the responsibility of the Contractor.

2 Products

2.1 **MATERIALS**

.1 Root barrier protection: 30 mil thick low density polyethylene sheet. 'XF 112' by Xeroflor Canada Inc., or approved alternative by Vitaroofs International Inc.

.2 Drainage mat: Flexible, non-woven, entangled polymeric filaments with geotextile filtration fabric bonded to one side. 'XF 108H' by Xeroflor Canada Inc., or approved alternative by Vitaroofs International Inc.

.3 Water retention mat: Recycled, synthetic fiber mat with a maximum saturated weight of 7.4 kg/m^2. 'XF 159' by Xeroflor Canada Inc., or approved alternative by Vitaroofs International Inc.

.4 Vegetation blanket: Pre-cultivated blanket consisting of fleece with nylon slings filled with planting substrate, with lightweight fleece underneath. The vegetation stock is mainly formed by sedum plants (minimum 8 sedum species). 'XF 301' by Xeroflor Canada Inc., or approved alternative by Vitaroofs International Inc.

.5 Edging trim: Perforated aluminum edging 'XF 100' by Xero Flor Canada Ltd.

.6 River stone: 16 mm to 32 mm diameter washed river stone, free from fines.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **SUBSTRATE PREPARATION AND PROTECTION**

.1 The surface of the roof shall be free of debris and swept prior to installing green roof components.

.2 Contractor accepts full responsibility for all green roof installation work completed prior to the proper operation of an irrigation system.

.3 When moving materials on roofs or installing green roof systems, protect exposed work surfaces to avoid damage. Use sturdy panelling to erect rooftop footpaths so as to cover materials installed and permit foot traffic and movement of new materials. The contracted installer is fully responsible for any damage.

.4 Ensure additional layer of roofing membrane has been provided with edges overlapped and bonded to protect roofing membrane.

3.3 MAT INSTALLATION

.1 Loose lay root barrier, lapping all sides and ends a minimum of 250 mm and staggering all ends laps.

.2 Install mats with geotextile fabric facing up, overlapping additional 100 mm wide fabric at edges and staggering end joints of mats.

.3 Roll out and loose lay retention fleece over drainage mat tightly butted together, staggering adjacent rolls.

.4 Roll out and loose lay over water retention mat.

.5 Water vegetation mat throughly in accordance with manufacturer's written instructions.

3.4 MAINTENANCE DURING CONSTRUCTION

.1 Contractor shall be responsible for interim maintenance of plant material up to point of final acceptance and client maintenance take-over and such maintenance shall be considered part of installation.

.2 Contractor must immediately replace all dead or dying plants as required by Consultant. Replacement of plants only at end of warranty period will not be acceptable.

.3 Interim maintenance for new planting shall consist of:

.1 Pruning, watering, fertilizing, cultivating, weeding, mulching, resetting plants to proper grades or upright position, restoration of planting beds, furnishing and application of such sprays and protective barriers as are necessary to keep plants free of insects, rodents, diseases and such maintenance as required at direction of Consultant.

.2 Keeping planting beds free of weeds; do not cultivate areas where groundcover is becoming established. Do not use herbicides or pesticides.

3.5 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Maintenance must be provided by green roof Contractor during the establishment period.

.2 Maintenance shall comprise weekly inspections, and application of watering, fertilizing, weeding and infill plantings, as required to keep vegetation vigorous and healthy.

.3 Contractor shall submit monthly reports, including list of all operations completed, including photographs.

3.6 **FIELD QUALITY CONTROL**

.1 Notify Consultant 72 hours prior to completion of green roof system and arrange for job site inspection in presence of Consultant.

.2 Contractor to schedule inspection by technical representative of green roof system to ensure system has been installed as per product specifications.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products equipment and services necessary for inverted fluid applied roofing Work in accordance with the Contract Documents.

.2 Coordination with the work of Section 07 55 65 to ensure that green roof system are installed over roofing membrane as required.

1.2 **REFERENCES**

.1 CSA A231.1/A231.2, Precast Concrete Paving Slabs/Precast Concrete Pavers.

.2 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit manufacturer's Product data in accordance with Section 01 10 10 indicating installation details, physical properties and detailed application and installation instructions, marked as applicable to Work.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Adjacent construction and typical details, dimensions, thickness, method of attachment, protection and penetration details.
  - .2 Location of each membrane penetration.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certificates:
- .1 Submit certifications for roofing items required at least 8 weeks prior to installation of Work of this Section.
- .2 Submit manufacturer's certification that roofing system materials and accessories supplied are compatible, meet Specification requirements and that installer is licensed/approved by membrane manufacturer.
- .3 Submit manufacturer's certification that roofing components are approved for use as complete roofing system.

.4 Submit Pre-Installation Notice (PIN): Copy to show that manufacturer's required Pre-Installation Notice (PIN) has been accepted and approved by the manufacturer.

.5 Submit Contractor's certification that roofing installers and quality control supervisors meet Specification requirements. Submit names of successful membrane installations in which certified personnel have performed tasks of comparable complexity and scope within preceding 5 years.

.6 Submit inspection reports and certification by manufacturer confirming that installations are in accordance with manufacturer's requirements.

1.4 QUALITY ASSURANCE

.1 Installer's qualifications: Perform Work of this Section by company, approved by Product manufacturer and having 5 years recent experience in Work of comparable complexity and scope.

.2 Mock-up:

.1 Construct one 10 m^2 mock-up of roofing system in a location acceptable to the Consultant. Show stages of application.

.2 Demonstrate one lap joint, one inside corner, and one outside corner.

.3 Obtain Consultant's acceptance. Accepted mock-up may become part of the Work. Mark mock-up to Consultant's acceptance and match remainder of work to accepted mock-up. Remove unacceptable mock-up.

.3 Pre-installation meeting: Arrange with Consultant and manufacturer's representative to inspect substrates and review installation procedures 48 hours in advance of installation.

1.5 SITE CONDITIONS

.1 Maintain air temperature and structural base temperature at roofing installation area above 5°C for 24 h before, during and 24 hr after installation.

.2 Do not apply roofing in wet weather.

.3 Ventilate area by forced air circulation during installation and curing periods for enclosed applications.

1.6 EXTENDED WARRANTY

.1 Submit a extended written warranty for fluid applied roofing in accordance with the General Conditions, except that warranty period is extended to 5 years from date of Substantial Performance of the Work.

.1 Warrant Work against water leakage, failure to stay in place, and ballast blow-off.

.2 Coverage: Complete replacement including effected adjacent Work.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, primers are to have low VOC content limits.

.2 Use products by only one manufacturer throughout Work of this Section.

.3 Primer:
- .1 ‘CCW 550' by Carlisle Coatings and Waterproofing.
- .2 ‘56170' by Hydrotech Membrane Corporation.
- .3 ‘Tremprime 6100’ by Tremco Roofing Inc.

.4 Elastomeric reinforcement (standard duty - 1.2 mm):
- .1 ‘CCW 711-90' by Carlisle Coatings and Waterproofing.
- .2 ‘6147' by Hydrotech Membrane Corporation.
- .3 ‘Elastomeric Sheeting' by Tremco Roofing Inc.

.5 Elastomeric reinforcement (heavy duty - 1.5 mm):
- .1 ‘CCW 711-90' by Carlisle Coatings and Waterproofing.
- .2 ‘6146' by Hydrotech Membrane Corporation.
- .3 ‘Elastomeric Sheeting' by Tremco.

.6 Securement bar: Continuous 25 mm wide x 3 mm thick aluminum bar, predrilled for mechanical attachment.

.7 Joint backing: Heat resistant, expanded closed-cell cross-linked polyethylene; ‘Cera-Rod Backer Rod’ by W. R. Meadows.

.8 Fabric reinforcement:
- .1 ‘CCW 500' by Carlisle Coatings and Waterproofing.
- .2 ‘Reemay 2014' by Hydrotech Membrane Corporation.
- .3 ‘Reinforcing Fabric (2014)' by Tremco Roofing Inc.

.9 Roofing membrane: One-part, 100% solids, rubberized asphalt.
- .1 ‘CCW 500' by Carlisle Coatings and Waterproofing.
- .2 ‘6125' by Hydrotech Membrane Corporation.
- .3 ‘Tremproof 6100' by Tremco Roofing Inc.

.10 Separation sheet: 0.2 mm thick minimum, polyethylene sheet.

.11 Protection board:
- .1 ‘CCW Protection Board V’ by Carlisle Coatings and Waterproofing.
- .2 ‘Hydroshield’ by Hydrotech Membrane Corporation.
- .3 ‘Tremco 2450' by Tremco Roofing Inc.

.12 Insulation: CAN/ULC-S701, Type 4; Extruded expanded polystyrene. Thickness: As indicated on Contract Drawings:
.1 'ROOFMATE' by by Dow Chemical Canada Inc.
.2 'Foamular 350' by Owens Corning.
.3 Board edges: Ship-lapped.

.13 Fabric Ballast Reducer Sheet: High density polyethylene filter fabric with UV inhibitors; 'Fabrene VIIE9' by PGI-Fabrene Inc. or approved alternative.

.14 Ballast: 25 mm diameter clear, screened, crushed stone or river gravel, free from fines or stones smaller than 15 mm or larger than 35 mm. Provide ballast providing a minimum SRI of 78 on mechanical roof only.

.15 Precast Pavers: Non-interlocking wire reinforced pavers, minimum 87 kg/m2, maximum 107 kg/m2 5% air-entrainment, minimum 55MPa compressive strength, non-slip texture finish, chamfered edges, patio quality, conforming to CSA A231.1/A231.2.

.16 Pedestals: Pav-El 5X by Envirospec Inc. Provide levelling plates as required and provide pedestals at each corner of paving slabs and splash pads.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Have manufacturer's authorized representative verify that conditions are acceptable for installation of roofing membrane.

3.2 **SUBSTRATE PREPARATION AND PROTECTION**

.1 Allow concrete substrates to cure minimum of 14 days prior to surface preparation.

.2 Ensure that form tie holes, honeycombed areas, and other voids and holes which may impair performance of roofing membrane, are filled flush and are dry.

.3 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and foreign matter detrimental to the adhesion of the hot rubberized asphalt.

.4 Remove debris from deck, blow substrate surfaces clean using oil-free compressed air.

.5 Prohibit traffic, on prepared areas to be roofed, until Work of this Section is completed.

.6 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from Work of this Section.

3.3 **PRIMER**

.1 Prime substrate surfaces in accordance with manufacturer's instructions.

.2 Apply primer uniformly as a fine spray at a rate 10 m^2/l; prevent over-spray and ponding of primer. Allow primer to dry fully before applying roofing membrane.

3.4 **REINFORCEMENT GENERAL**

.1 Fabric and membrane reinforcing sheets :
- .1 Overlap 150 mm at end laps and seal with roofing membrane.
- .2 Prevent wrinkles and fishmouths.
- .3 Wrap outside horizontal and vertical corner with 150 mm membrane reinforcement embedded in roofing membrane.
- .4 Supply and install heavy duty membrane reinforcement at drains and protrusions.

3.5 **CRACK AND JOINT TREATMENT**

.1 Horizontal substrate cracks and joints, under 3 mm wide including control joints: Seal with 150 mm wide, continuous fabric reinforcing embedded into 3 mm thick, 300 mm wide strip coating of roofing membrane.Centre fabric reinforcing on crack or joint and extend both roofing membrane and fabric reinforcing minimum 50 mm beyond end of crack or joint.

.2 Horizontal substrate cracks and joints, over 3 mm wide: Seal with 150 mm wide, continuous membrane reinforcing embedded into 3 mm thick, 300 mm wide strip coating of roofing membrane. Centre membrane reinforcement on crack or joint and extend both roofing membrane and membrane reinforcing minimum 50 mm beyond end of crack or joint.

.3 Horizontal to vertical junctures and vertical construction joints: Seal with 300 mm wide, continuous membrane reinforcing embedded into 3 mm thick, 450 mm wide strip coating of roofing membrane. Centre membrane reinforcing on juncture extending 150 mm onto both horizontal and vertical surfaces. Supply and install continuous fastening bar along top edge of membrane reinforcement.

.4 Horizontal to vertical junctures and vertical control joints: Seal with 400 mm wide, continuous heavy duty membrane reinforcing embedded into 3 mm thick, 550 mm wide strip coating of roofing membrane. Centre heavy duty membrane reinforcing on juncture extending 200 mm onto both horizontal and vertical surfaces. Supply and install continuous fastening bar along top edge of heavy duty membrane reinforcement.

3.6 **ROOFING MEMBRANE**

.1 Install roofing membrane in accordance with reviewed Shop Drawings and manufacturer's instructions.

.2 Use manufacturer's recommended installation equipment and carefully monitor roofing membrane kettle temperatures.

.3 Heat membrane in a double jacketed, oil bath melter with mechanical agitation, specifically designed for the preparation of a rubberized asphalt membrane.

.4 Heat membrane until membrane can be drawn-free flowing at a temperature range between 190°C and 204°C.

.5 Install first layer of roofing membrane to a uniform minimum thickness of 2 mm and an average of 3 mm, forming a continuous monolithic coating over horizontal and vertical surfaces.

.6 Embed fabric reinforcement into hot membrane, overlap fabric 50 mm, ensure one layer of roofing membrane between overlaps.

.7 Install second layer of roofing membrane to minimum thickness of 2 mm and an average of 3 mm for total membrane thickness of 5-6 mm minimum.

.8 Reinforce corners with 2 plies of fabric reinforcement, overlap sides and ends 100 mm.

.9 Install separation sheet in accordance with detailed system, and manufacturer's instructions. To ensure a good bond embed the separator sheet into the membrane while it is still hot. To ensure complete coverage overlap adjoining sheet edges (dry) a minimum of 50 mm - 75 mm.

3.7 **INSULATION**

.1 Install insulation loosely laid over roofing membrane in a staggered manner and tightly butted together. Maximum acceptable gap between insulation boards is 9.5 mm. Insulation must be installed within 13 mm of all projections and penetrations.

.2 In multi-layer insulation applications, bottom layer of insulation shall be the thickest layer, minimum 50 mm. Install all layers unadhered to each other and all joints in relation to underlying layers staggered.

3.8 **BALLAST REDUCING FABRIC**

.1 Position the fabric over the insulation, black side up, as follows:
- .1 Overlap all edges a minimum of 300 mm.
- .2 Install the fabric so that no joints will exist between the sheets parallel to and within 1800 mm of the roof perimeter.

.3 Extend the fabric to 50 mm - 75 mm above the ballast at the perimeter and penetrations.
.4 Extend the fabric to drain bases or bonnets, but to not cover drains or restrict water flow to the drain.
.5 Install fabric around all penetrations in order to prevent stone entry into the space between the penetration and the insulation.

3.9 **BALLAST**

.1 Install ballast at a minimum rate of 48.8 kg/m^2 progressively as membrane, insulation, and fabric is laid. Carefully spread ballast to an even thickness over entire roof.

.2 Install a 1200 mm wide continuous row of precast concrete pavers or additional 30 kg/m^2 minimum of ballast at:
.1 The roof perimeter.
.2 Penetrations.
.3 Drains.
.4 Any location where the insulation boards terminate.

.3 Any ballast displaced by a pavers should be distributed around the paver, to maintain the specified average ballast rate.

.4 Install pavers on paver pedestals in locations shown butted tightly, maximum 6 mm gap.

3.10 **FIELD QUALITY CONTROL**

.1 Coordinate inspection and testing of fluid applied roofing with Consultant.

.2 Temporarily plug drains and dam horizontal surface areas to be tested. Flood with water to minimum depth of 80 mm. Maintain flooded depth for 24 h. Have manufacturer's representative and Consultant witness test.

.3 If leaks occur repair in accordance with manufacturer's instructions and retest.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for flashing and sheet metal Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

.2 ASTM C920, Specification for Elastomeric Joint Sealants.

.3 CRCA Roofing Manual, Canadian Roofing Contractors Association.

1.3 **SUBMITTALS**

.1 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Proposed method of shaping, forming, jointing.
  - .2 Fastening, and application of flashing and sheet metal Work.

.2 Samples:
- .1 Submit following samples in accordance with Section 01 10 10:
  - .1 50 x 50 mm samples of sheet metal material, colour and finish.
  - .2 Representative sample section of prepainted metal flashing illustrating S locking jointing method, minimum 600 mm long.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, sealants and paints are to have low VOC content limits.

.2 Prepainted sheet steel: ASTM A653/A653M; Classification LFQ, Grade A, Z275 zinc coating designation, 0.60 mm minimum base steel thickness, commercial quality, prefinished with Perspectra Series coating system by U.S. Steel Canada, or WeatherX by Vicwest Steel. Colour as selected by Consultant.

.3 Flexible through-wall flashings: As specified in Sections 04 20 00.

.4 Plastic cement: Trowel grade asphalt mastic.

.5 Sealant: ASTM C920, Type S, Grade NS, Class 25; High-performance, medium-modulus, one-part, neutral-cure silicone sealant. 'CWS' by Dow Corning or approved alternative.

.6 Cleats and starter strips: Starter strips to be continuous, of same material as flashing used, 1.2 mm thick.

.7 Fasteners: Flat head roofing nails of length, type and thickness suitable for metal flashing application.

.8 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.9 Touch-up paint: Same colour and material as prepainted sheet steel, as recommended by prefinished coating manufacturer.

2.2 **FABRICATION**

.1 Fabricate copings, flashings, curb counter flashings, starter strips, scuppers and miscellaneous flashings in accordance with CRCA and to details shown.

.2 Breakform prepainted sheet material at shop to shapes shown. Make end joints where adjacent lengths of metal flashing meet, in accordance with jointing method specified.

.3 Form pieces in 2400 mm maximum practical lengths. Make allowance for expansion at joints.

.4 Hem exposed edges 13 mm minimum on underside for appearance and stiffness. Mitre and seal corners with sealant.

.5 Reglets and Cap flashing: Form flashings of as detailed and in accordance with CRCA. Provide slotted fixing holes and steel/plastic washer fasteners.

.6 Scuppers:
- .1 Form scuppers from prefinished steel sheet metal.
- .2 Sizes and profiles as indicated.
- .3 Provide necessary fastenings.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install coping flashings, curb counter flashings, starter strips, scuppers and miscellaneous flashings to details shown on the Contract Drawings and in accordance with CRCA .

.2 Use concealed fasteners. Exposed fasteners such as pop rivets are not allowed.

.3 Install continuous starter strips to present a true, non-waving, leading edge. Anchor to back-up for a rigid, secure installation.

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips.

.5 Make end joints using an S lock joint. Execute by inserting end coping length in 25 mm deep S lock formed in end of adjacent length. Extend concealed portion of S lock 25 mm outwards and nail to substrate. Face nailing of joints will not be permitted.

.6 Seal where necessary to form weathertight seal between flashing and adjoining surfaces and between flashing and other Work. Sealing Work consists of bedding between members where possible. Tool sealant to concave profile where exposed.

.7 Insert metal flashing under cap flashing to form weathertight junction.

.8 Caulk flashing at cap flashing with sealant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for firestopping and smoke seals Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM E814, Test Method for Fire Tests of Through-Penetration Fire Stops.

.2 CAN/CGSB 19.13, Sealing Compound, One Component, Elastomeric, Chemical Curing.

.3 CAN/ULC S102, Surface Burning Characteristics of Building Materials and Assemblies.

.4 CAN/ULC S115, Standard Method of Fire Tests of Firestop Systems.

.5 CAN/ULC S702, Thermal Insulation, Mineral Fibre for Buildings.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
  - .2 Product transportation, storage, handling and installation requirements.
  - .3 Submit firestop and smoke seal manufacturer's Product data for materials and prefabricated devices, including manufacturer's printed installation instructions.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Fire rated and smoke sealed systems for each typical application.
  - .2 Construction details, accurately reflecting actual job conditions.
  - .3 ULC or Intertek Testing assembly listing.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.

.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certification:
- .1 Submit certified documentation from manufacturer for each worker performing Work of this Section.
- .2 Submit installer's and Product manufacturer's certification verifying compliance with the Contract Documents and conformance with ASTM E814 and CAN/ULC S115.

1.4 **QUALITY ASSURANCE**

.1 Perform Work of this Section by manufacturer-approved, skilled, qualified, and experienced workers trained in installation of Work of this Section.

1.5 **SITE CONDITIONS**

.1 Conform to manufacturer's requirements and maintain a minimum temperature of 5^0 C for a minimum period of 24 h before application, during, and until application is fully cured.

.2 Maintain sealant at a minimum 18° C for best workability.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Acceptable manufacturers of rated systems include:
- .1 AD Fire Protection Systems Inc.
- .2 Hilti Canada Corporation.
- .3 3M Canada Inc.
- .4 Tremco Ltd.

2.2 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.

.2 Firestop sealant: single component, low modulus, silicone rubber, moisture curing, ULC labelled to CAN/CGSB 19.13-M and CAN/ULC S115.

.3 Firestop insulation: to CAN/ULC-S702, Type 2; mineral fibre manufactured from rock or slag, suitable for manual application.
- .1 Density: Minimum 64 kg/m^3 when tested to ASTM C303.
- .2 Combustibility: Noncombustible to CAN/ULC S114.
- .3 Melt temperature: >1175 degrees C.

.4 Surface burning characteristics: to CAN/ULC S102, maximum flame spread of 0, smoke developed of 0.
.5 Moisture Absorption: 0.04 percent when tested to ASTM C1104.
.6 Smoulder Resistance: 0.01 percent when tested to CAN/ULC S129.

.4 Damming, back-up, supports, and anchorage: In accordance with manufacturer's fire rated systems and to acceptance of authorities having jurisdiction.

.5 Primer: As recommended by firestopping sealant manufacturer.

2.3 **SYSTEMS**

.1 Firestopping and smoke seals: ULC or Intertek Testing Services listed Products and systems in accordance with CAN/ULC S115 suitable to actual application and installation conditions.

.2 Do not use Products containing asbestos.

.3 Firestopping components shall not contain volatile solvents or require special application to protect plastic pipe from firestopping compound.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Verify that substrates and surfaces to receive firestopping and smoke seals are clean, dry, and frost free.

3.2 **FIRESTOP AND SMOKE SEAL LOCATIONS AND RATINGS**

.1 Install ULC firestop and smoke seal system rated to match fire resistance ratings and smoke seal ratings of assemblies into which they are installed.

.2 Install firestop and smoke seal systems. Use systems with required fire and smoke ratings at following typical locations, including but not limited to:
.1 Gaps at intersections of fire-resistance rated masonry and gypsum board partitions.
.2 Control and sway joints in fire-resistance rated walls and partitions such as masonry and gypsum board.
.3 Gaps at top of fire-resistance rated partitions such as masonry and gypsum board partitions.
.4 Penetrations through fire-resistance rated walls and partitions including mechanical and electrical services and openings and sleeves for future use.
.5 Penetrations through fire-resistance rated floor slabs, ceilings, and roofs.

.6 Gaps at edge of floor slabs at exterior walls such as curtain wall and precast concrete panels.
.7 Perimeter of retaining angles on rigid ducts greater than 0.012 m^2, firestopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
.8 At non-rated assemblies that require a smoke seal.
.9 Where required by Ontario Building Code.

3.3 **PREPARATION**

.1 Prepare, modify, and adjust void sizes, proportions, and conditions to conform to fire rated and smoke sealed assembly requirements such as assembly opening size and dimensional restrictions.

.2 Mask adjacent surfaces to avoid spillage and over-coating of adjacent surfaces. Remove stains from adjacent surfaces.

3.4 **INSTALLATION**

.1 Install firestopping and smoke seal systems in accordance with manufacturer's instructions and fire rated assembly to establish continuity and integrity of fire separations.

.2 Install firestop insulation in compacted thicknesses required by ULC design. Compress insulation approximately 50 percent.

.3 Install primers as recommended by firestop and smoke seal Product manufacturers.

.4 Install temporary forming, damming, back-up as required, remove after materials have achieved initial cure and will resist displacement.

.5 Install firestop and smoke seal filler in horizontal joints providing 25% compression fit.

.6 Use resilient, elastomeric firestopping and smoke seal systems in following locations:
.1 Openings and sleeves for future use.
.2 Penetration systems subject to vibration or thermal movement.
.3 Penetration systems in acoustical containment enclosures.

.7 Trowel and tool exposed firestop and smoke seal Product surfaces to uniform, smooth finish.

.8 Repair damaged firestopped and smoke sealed surfaces to acceptance of Consultant.

.9 Identify each firestop and smoke seal penetration assembly with permanent label listing following:
.1 Assembly and rating in hours.
.2 Date of installation.

.3 Installing company's name and telephone number.

.10 Do not cover materials until full cure has taken place.

3.5 **CLEAN-UP**

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for sealant Work in accordance with the Contract Documents.

.2 Work of this Section does not include sealants in firestopping and smoke sealed assemblies.

1.2 **REFERENCES**

.1 ASTM C834, Specification for Latex Sealants.

.2 ASTM C920, Specification for Elastomeric Joint Sealants.

.3 ASTM C1330, Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

1.3 **SUBMITTALS**

.1 Product data: Submit copies of Product data in accordance with Section 01 10 10 describing type, composition and recommendations or directions for surface preparation, material preparation and material installation.

.2 Samples:
.1 Submit following samples in accordance with Section 01 10 10.
.1 Two samples of sealant/caulking, for colour selection.
.2 Two samples of back-up material and primer for physical characteristics.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
.1 Indicate cost, post consumer and pre-consumer recycled content for each product.
.2 Identify each regionally extracted and manufactured material, its source and cost.
.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.4 **QUALITY ASSURANCE**

.1 Qualifications: Work of this Section shall be executed by trained applicators approved by sealant manufacturer and having a minimum of 5 years proven experience.

1.5 **SITE CONDITIONS**

.1 Do not install materials when ambient air temperature is less than 5 °C, when recesses are wet or damp, or to manufacturer's recommendations.

1.6 **DELIVERY, STORAGE AND HANDLING**

.1 Arrange delivery of materials in original, unopened packages with labels intact, including batch number, and ensure that on-site storage is kept to a minimum. Do not store materials on site where there exists any danger of damage from moisture, direct sunlight, freezing and other contaminants.

1.7 **EXTENDED WARRANTY**

.1 Submit a extended warranty for Sealant Work in accordance with General Conditions, except that warranty period is extended to 2 years from date of Substantial Performance of the Work.
- .1 Warrant against leakage, cracking, crumbling, melting, shrinkage, running, loss of adhesion and staining adjacent surfaces.
- .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **MATERIALS**

.1 General:
- .1 All materials under Work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.
- .2 Use materials as received from manufacturers, without additives or adulterations. Use one manufacturer's Product for each kind of Product specified.

.2 Sealant **Type A**: ASTM C920, Type S, Grade NS, Class 100/50; One-part, low-modulus, moisture-curing, silicone. Colour as selected by Consultant. Primer as recommended by manufacturer.
- .1 ‘Dow Corning 790' by Dow Corning.
- .2 ‘Spectrem 1' by Tremco.
- .3 ‘Sikasil-C 990' by Sika.

.3 Sealant **Type B**: ASTM C920, Type S, Grade NS; One-part mildew-resistant silicone, in standard colours selected.
- .1 ‘786 Mildew Resistant Silicone Sealant’ by Dow Corning Inc.
- .2 ‘Tremsil 200 Silicone Sealant’ by Tremco Ltd.
- .3 ‘Sikasil GP Mildew Resistant' by Sika.

.4 Sealant **Type C**: ASTM C834; Pure acrylic siliconized sealant; in standard white colour (paintable).
- .1 ‘Tremflex 834 Silconized Sealant’ by Tremco Ltd.

.2 Or approved alternative by Dow Corning Inc. or Sika.

2.2 **ACCESSORIES**

.1 Primers: Type recommended by material manufacturers for various substrates, primers to prevent staining of adjacent surfaces encountered on project.

.2 Joint backing: ASTM C1330; Round, solid section, closed cell, skinned surface, soft polyethylene foam gasket stock, compatible with primer and sealant materials, 30 to 50% oversized, Shore A hardness of 20, tensile strength 140 to 200 kPa. Bond breaker type surface.

.3 Bond breaker: Type recommended by material manufacturers.

.4 Void filler around the window frames to be one part expanding polyurethane foam.

.5 Cleaning agents: As recommended by material manufacturer, non-staining, harmless to substrates and adjacent finished surfaces.

2.3 **MIXING**

.1 Follow manufacturers instructions on mixing, shelf and pot life.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Prepare joints to receive sealants to manufacturer's instructions. Ensure that joints are clean and dry and ferrous surfaces are free from rust and oil.

.2 Clean recesses to receive sealant, to be free of dirt, dust, loose material, oil, grease, form release agents and other substances detrimental to sealant's performance.
- .1 Remove lacquer or other protective coatings from metal surfaces, without damaging metal finish, using oil-free solvents. Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sand blasting.
- .2 Ensure recess is dry.
- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings. Remove incompatible coatings as required.

.3 Ensure that all materials in contact with sealant are compatible. Test substrate for adhesion.

.4 Depth of recess: Maintain depth to ½ joint width up to a maximum of 13 mm and not less than 6 mm at centre of joint. For greater depth, use joint backing under. Where recess is less than specified depth, cut back surface of recess to specified recess depth.

.5 Install polyethylene backing rod in joints 6 mm or more in width. Roll backing rod into joint. Do not stretch or bend backing rod. Install bond breaker to back of recess.

.6 Prime sides of recess, in accordance with sealant manufacturer's instructions.

.7 Condition products for use in accordance with manufacturer's recommendations.

3.3 **INSTALLATION**

.1 Apply sealant immediately after adjoining Work is in condition to receive such Work. Apply sealant in continuous bead using gun with correctly sized nozzle. Use sufficient pressure to evenly fill joint.

.2 Ensure sealant has full uniform contact with, and adhesion to, side surfaces of recess. Superficial painting with skin bead is not acceptable. Tool sealant to smooth surface, free from ridges, wrinkles, sags, air pockets, embedded impurities, dirt, stains or other defects.
   .1 At recesses in angular surfaces, finish sealant with flat profile, flush with face of material at each side.
   .2 At recesses in flush surfaces, finish compound with concave face, flush with face of material at each side.

.3 Make sealant bead uniform in colour.

.4 Cure sealants in accordance with sealant manufacturer's instructions. Do not cover up sealants until proper curing has taken place.

.5 Immediately remove excess compound or droppings which would set up or become difficult to remove from adjacent finished surfaces, using recommended cleaners, as work progresses. Do not use scrapers, chemicals or other tools which could damage finished surfaces. Remove defective sealant.

.6 Clean recesses and re-apply sealant.

.7 Remove masking tape immediately after joints have been sealed and tooled.

3.4 **CLEANING**

.1 Clean surfaces adjacent to joints, remove sealant smears or other soiling resulting from application of sealants. At metal surfaces, remove residue. Do not mar or damage finishes on materials adjacent to joints. Repair or replace marred or damaged materials.

3.5 **SCHEDULE OF LOCATIONS**

.1 Following sealant location schedule is included for convenience and may not be complete. Examine Contract Drawings and other specification sections and determine entire extent of Work of this Section. Generally seal following locations:
- .1 Concrete, masonry, wood and stone to metal.
- .2 Wood to masonry, concrete and stone.
- .3 Metal to metal.
- .4 All dissimilar materials.

.2 Sealant **Type A**:
- .1 Exterior joints between masonry and steel or aluminum.
- .2 Exterior joints between masonry and shelf angle.
- .3 Exterior joints between steel or aluminum and concrete or masonry.
- .4 Interior and exterior control joints, except in floors .
- .5 Door frames, louvre frames, interior and exterior side.
- .6 Protrusions through interior and exterior walls and floors, interior and exterior side, except where fire rated seals are required.
- .7 Seal thresholds.

.3 Sealant **Type B:**
- .1 Control joints in tiled areas.
- .2 Between vanity and tile.
- .3 Between vanity and mechanical fixtures/fittings.
- .4 Between access panels and tile.
- .5 Between tiles and adjacent materials.

.4 Sealant **Type C:**
- .1 Perimeter of kitchen counters.
- .2 Perimeter of interior windows.
- .3 Perimeter of firehose cabinets and garbage/linen chutes.
- .4 Junction between drywall and masonry.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for the metal doors and frames Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

.2 ASTM A568/A568M, Specification for General Requirements for Steel, Carbon and High-Strength Low-Alloy, Hot-Rolled Sheet and Cold-Rolled Sheet.

.3 CAN4/ULC-S104M, Standard Method for Fire Test of Door Assemblies.

.4 CAN4/ULC-S105M, Standard Specification for Fire Door Frames, Meeting the Performance Required by CAN4/ULC-S104M.

.5 CAN/CGSB-1.198, Cementitious Primer, (for Galvanized Surfaces).

.6 CGSB 41-GP-19Ma, Rigid Vinyl Extrusions for Windows and Doors.

.7 CAN/ULC-S702, Thermal Insulation, Mineral Fibre for Buildings.

.8 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.9 CSA W59-M, Welded Steel Construction (Metal Arc Welding).

.10 NFPA 80, Standard for Fire Doors and Other Opening Protectives.

.11 NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

1.3 **DESIGN REQUIREMENTS**

.1 Design exterior frame assemblies to accommodate expansion and contraction when subjected to minimum and maximum surface temperature of -35°C to 35°C.

1.4 **SUBMITTALS**

.1 Product data: Submit manufacturer's Product data in accordance with Section 01 10 10 indicating door and frame construction.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 for each type of door and frame indicating:
  - .1 Thickness and type of steel.
  - .2 Thickness and type of core.

.3 Thickness and type of steel stiffeners and location of them within the door.
.4 Thickness and type of metal facing on edges of door and method of fastening.
.5 Location of mortises, reinforcement, anchorages, joining, welding, sleeving, exposed fasteners, openings and arrangement for hardware.

.2 Include schedule identifying each unit with door marks and numbers relating to numbering on Contract Drawings and in door schedule. Indicate doors and frames to be fire rated.

.3 Samples:

.1 Submit samples in accordance with Section 01 10 10 of the following:

.1 Duplicate samples of neoprene door silencers demonstrating colour and finish for Consultant's approval.
.2 Duplicate samples of door grilles for Consultant's approval of finish and size.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.

.1 Indicate cost, post consumer and pre-consumer recycled content for each product.
.2 Identify each regionally extracted and manufactured material, its source and cost.
.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.5 **QUALITY ASSURANCE**

.1 Perform Work in accordance with requirements by a member of the Canadian Steel Door and Frame Manufacturers Association.

.2 Label and list fire rated doors and frames by an organization acceptable to authorities having jurisdiction and accredited by the Standards Council of Canada in conformance with CAN4/ULC-S104M and CAN4/ULC-S105M for ratings indicated, Labelling shall be in accordance with NFPA 80.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Baron Metal Industries Inc.

.2 Daybar Industries Limited

.3 S.W Fleming Limited.

2.2 MATERIALS

.1 General:
- .1 All materials under Work of this Section, including but not limited to, primers are to have low VOC content limits.
- .2 Wherever possible, metals used in work of this Section are to contain recycled content.

.2 Steel: ASTM A568/A568M, Class 1; Commercial grade steel, hot dip galvanized to ASTM A653/A653M, ZF075 satin coat finish.

.3 Minimum base steel thickness:

.1	Frames	1.6 mm
.2	Typical doors	1.2 mm
.3	Interior stiffeners	0.9 mm
.4	Lock/strike reinforcements	1.6 mm
.5	Hinge reinforcements	2.7 mm
.6	All other reinforcement	1.6 mm
.7	Top and bottom channels	1.2 mm
.8	Glazing stops	0.9 mm
.9	Guard boxes	0.9 mm
.10	Jamb spreaders	0.9 mm

.4 Top caps and thermal breaks: CGSB 41-GP-19Ma; Rigid PVC extrusions.

.5 Primer: CAN/CGSB 1.198.

.6 Core material:
- .1 Interior doors: Mineral fibre insulation with a minimum face density of 24 kg/m^3.
- .2 Exterior doors: Rigid poly/isocyanurate, closed cell insulation, 32 kg/m^3, thermal value: RSI 1.9.
- .3 Fire rated doors: Mineral fibre insulation to CAN/ULC S702, Type 1A; 24 kg/m^3.
- .4 Temperature rise rated (TRR); core composition to limit temperature rise on the unexposed side of door to 250 ^{o}C at 30 or 60 minutes, as indicated. Core to be tested as part of a complete door assembly, in accordance with CAN4/ULC-S104 or NFPA 252

.7 Screws: Stainless steel screws with countersunk flat head.

.8 Door silencers: Type 6-180, black neoprene.

.9 Frame anchors:
- .1 Frames in masonry: 1.2 mm minimum, adjustable T-strap jamb anchors.
- .2 Frames in steel stud partitions: 0.9 mm minimum steel anchors of suitable design securely welded inside each jamb.
- .3 Labeled frames: In accordance with ULC requirements.

.10 Floor anchors: 1.6 mm minimum adjustable floor clip angles with 2 holes for anchorage to floor.

.11 Labels for fire doors and door frame: Brass plate, riveted to door and door frame.

.12 Grilles: Extruded aluminum door grilles with minimum 50% free area; Door grilles are to be provided where noted and as per mechanical drawings. 'Door Grilles' as manufactured by Hart and Cooley or approved alternative. Provide samples for Consultant's approval.

.13 Glass and glazing: In accordance with Section 08 80 00.

2.3 **FABRICATION**

.1 General
- .1 Fabricate doors and frames in accordance with reviewed shop drawings.
- .2 Welding: CSA W59-M to produce a finished unit with no visible seams or joints, square, true and free of distortion.
- .3 Welding: Continuous unless specified otherwise. Execute welding by a firm fully acceptable to the Canadian Welding Bureau to requirements of CSA W47.1.
- .4 Form profiles accurately to details shown on Contract Drawings.
- .5 Ream and remove burrs from drilled and punched holes.
- .6 Grind welded corners and joints to a flat plane and fill with metallic filler and sand to a uniform smooth finish. Apply one coat of primer.

.2 Frames, windows, and screens:
- .1 Fabricate frames of welded construction. Cut mitres and joints accurately and weld continuously on inside of frame profile. Exterior frames to be thermally broken.
- .2 Construct large frame sections with provision for on Site assembly to suit Site conditions.
- .3 Blank, reinforce, drill and tap frames for mortised, templated hardware. Protect mortised cut-outs with guard boxes.
- .4 Reinforce frames where required for surface mounted hardware.
- .5 Reinforce frames over 1200 mm wide with roll formed steel channels or hollow structural sections specified in Section 05 50 00 and as indicated on drawings.
- .6 Furnish exterior door frames with a continuously welded integral steel weather drip at head of frame.
- .7 Prepare each door opening for single stud rubber door silencers, 3 for single door openings located in strike jamb, and 2 for double door openings located in head.

.8 Install 2 channel or angle spreaders per frame, to ensure correct frame alignment. Install stiffener plates or spreaders between frame trim where required, to prevent bending of trim and to maintain alignment when setting in place.

.9 Form channel glazing stops minimum 16 mm height, accurately cut, mitred, fitted and fastened to frame sections with stainless steel counter-sunk, flat head screws spaced at maximum 450 mm throughout and 50 mm from each end.

.3 Anchorage:

.1 Anchor units to floor and wall construction. Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb, minimum number of anchors for each jamb:

.1	Frames up to 2285 mm	3 anchors.
.2	Frames from 2285 mm to 2440 mm	4 anchors.

.2 Where frames are to be set in masonry or concrete, supply adjustable anchors to trade installing frame.

.3 Fabricate frames for installation in steel stud partitions with steel anchors of suitable design, minimum number of anchors for each jamb :

.1	Frames up to 2285 mm height	4 anchors.
.2	Frames 2285 mm to 2440 mm	5 anchors.

.4 General Door Requirements:

.1 Hollow steel construction, flush swing type, of sizes to conform to details, schedules and reviewed shop drawings with provisions for cut-outs for glass and grilles and reinforced to receive hardware fastenings.

.2 Blank, reinforce, drill and tap doors for mortised, templated hardware. Where required, reinforce doors for surface mounted hardware and door closers.

.3 Reinforce oversized doors with steel channels and plates specified in Section 05 50 00 and as indicated on drawings.

.4 Where openings are required, form integral cut-outs with framing, glass stop moldings and division bars.

.5 Install grilles to fit tight and secure into openings.

.6 Bevel both stiles of single doors 1 in 16.

.7 Make provision in doors for grilles and glazing where indicated and provide necessary glazing stops.

.5 Interior Doors:

.1 Supply and install inverted, recessed, mechanically interlocked with tack welded channels at top and bottom of doors.

.2 Fabricate doors with joints between front and back panels meeting on stile edges. Make joints mechanically interlocked and tack welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.

.3 Fill hollow space within door and vertical stiffeners from top to bottom with mineral fibre batt insulation.

.6 Exterior Doors:

.1 Supply and install inverted, recessed, mechanically interlocked with tack welded channels at top and bottom of doors. Supply and install PVC top caps.

.2 Fabricate doors with joints between front and back panels meeting on stile edges. Make joints mechanically interlocked and tack welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.

.3 Fill hollow space within door from top to bottom with rigid polyisocyanurate insulation.

.7 Fire Rated and Temperature Rise Rated Doors:

.1 Supply and install inverted, recessed, spot welded channels at top and bottom of doors. Supply and install steel flush top caps on exterior doors.

.2 Fabricate doors with joints between front and back panels meeting on stile edges. Make joints mechanically interlocked and tack welded for entire height of door. After welding has been completed, grind joints smooth to match metal. Ensure that no filler is used in joints.

.3 Fabricate doors to achieve fire rating as indicated on drawings and in accordance with ULC. Provide ULC label plate on door at hinged edge midway between top hinge and head of door.

.4 Fabricate fire rated door from specified core material.

.5 Fabricate door from temperature rise rated core laminated under pressure to each face.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **HOLLOW METAL DOOR, FRAME, WINDOW AND SCREEN INSTALLATION**

.1 Install hollow metal doors, frames, windows, and screens plumb, square, level, secure, and at correct elevation.

.2 Install doors clear of floor finishes, and with the correct rebate opening for the door installation. Install door silencers.

.3 Secure anchorages and connections to adjacent construction. Brace frames rigidly in position while building-in. Remove temporary steel shipping jamb spreaders. Install wood spreaders at third points of frame rebate height to maintain frame width. Supply and install vertical supports as indicated on drawings for openings over 1200 mm in width. Remove wood spreaders after frames have been built-in.

.4 Allow for structural deflection and prevent structural loads from being transmitted to hollow metal frames.

.5 Touch-up areas where galvanized coating has been removed or damaged with primer.

.6 Fire rated doors: Install fire rated doors and frames in accordance with requirements of NFPA 80.

3.3 **ADJUSTING AND CLEANING**

.1 Adjust doors for smooth and balanced door movement.

.2 Clean doors, frames and screens.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, tool, equipment and services necessary for aluminum doors work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 AAMA 605.2, Voluntary Specification for High Performance Coatings on Architectural Extrusions and Panels.

.2 AAMA CW-10, Care and Handling of Architectural Aluminum from Shop to Site.

.3 ANSI, H35.1M Alloy and Temper Designation Systems for Aluminum (Metric).

.4 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

.5 ASTM B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.6 ASTM B221M, Specification for Aluminum-Alloy Extruded Bars, Rods, Wires, Profiles and Tubes.

.7 ASTM F738M, Specification for Stainless Steel Metric Bolts, Screws, and Studs.

.8 CAN/CGSB-1.108-M, Bituminous Solvent Type Paint.

1.3 **DESIGN REQUIREMENTS**

.1 Design aluminum doors in accordance with following Climatic Design Data for Toronto contained in the Ontario Building Code:
- .1 Design temperature: January 1%, July 2 1/2% .
- .2 Hourly wind pressures: 1 in 50 year occurrence.

.2 Design aluminum doors to accommodate following without producing detrimental effect:
- .1 Cyclic 20 degrees C daily thermal swing of components.
- .2 Cyclic, dynamic loading and release of loads such as wind loads.
- .3 13 mm vertical deflection in supporting structure and movement of supporting structure due to live, dead load, and creep or deflections, seismic load, sway displacement and similar items.

.3 Restrict air infiltration/exfiltration, through aluminum work in accordance with ASTM E283 at pressure differential as indicated:
- .1 Doors (per door): 2.78 m3/h m per linear metre of crack at differential of 75 Pa.

.4 Prevent deflection and permanent or progressive glazing displacement. Restrict horizontal and vertical deflection to less than L/175 (under uniformly distributed positive design wind load), and 10 mm maximum regardless of span.

.5 Design anchorage inserts for installation as part of other Sections of Work. Design anchorage assemblies to with a minimum safety factor of 2.0 and to accommodate construction and installation tolerances.

.6 Provide all reinforcing within aluminum members as required by design and OBC to provide structurally sound assembly. In any case, mullion size shall not be increased due to provision of reinforcing.

.7 Design aluminum doors, frames, and screens and connections to substrate where the bottom of the aluminum doors, frames, and screens extends to a point below 1070 mm above finished floor level and separates a floor level from an adjacent interconnected space to withstand the required guard and handrail loads in accordance with the OBC and applicable local regulations. When requested by Consultant, provide a letter signed and sealed by a Professional Engineer certifying that the aluminum frames and screens conform to the OBC requirements.

1.4 **SUBMITTALS**

.1 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Plans, sections, details, type of extrusions, profiles, finishes, panels, operating components, doors, related flashings, closures, fillers, and end caps, and sealants.
  - .2 Products and glazing types.
  - .3 Anchorage inserts, system installation tolerances.
  - .4 Section and hardware reinforcement, anchorage, assembly fixings.
  - .5 Detailing, locations, and allowances for movement, expansion, contraction.

.2 Samples:
- .1 Submit two samples of following in accordance with Section 01 10 10.
  - .1 250 mm long samples of each type of extrusion and finish.
  - .2 One complete corner detail of door frame, glazing, and finish for each door type.
  - .3 Each door hardware item for Consultant's approval.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.

.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Reports:
- .1 Submit documentation to substantiate ten years of experience in aluminum window, screen, and door manufacture and installation.
- .2 Submit written manufacturer's certificate certifying compliance with the specifications.

.5 Close-out submittals: Submit window data for incorporation into the Operations and Maintenance Manual as part of Section 01 10 10.

1.5 QUALITY ASSURANCE

.1 Retain a Professional Engineer, licensed in Province of Ontario, with experience in work of comparable complexity and scope to perform the following services as part of the Work of this Section:
- .1 Design of aluminum doors, frames, and screens work.
- .2 Review, stamp, and sign shop drawings.
- .3 Conduct on-Site inspections and prepare and submit inspection reports.

.2 Mock-up:
- .1 Fabricate, deliver, and erect one, full scale mock-up of each type of aluminum door, frame, and screen work, in location acceptable to Consultant.
- .2 Demonstrate full range of Products, finishes, textures, quality of fabrication, and workmanship.
- .3 Mock-up may form part of final Work, if acceptable to Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Handle aluminum work in accordance with AAMA CW-10.

.2 Protect aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Do not remove before final cleaning of building.

1.7 EXTENDED WARRANTY

.1 Submit a warranty for glazed partition work in accordance with General Conditions, except that warranty period is extended to 5 years.
- .1 Warrant against failure to meet the design criteria and requirements.
- .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **ACCEPTABLE MANUFACTURER(S) AND SYSTEM(S)**

.1 Framing system: ‘1800 Series’ by Alumicor Limited or ‘Trifab VG 451’ by Kawneer Company Canada Limited or approved alternative.

.2 Aluminum doors:
- .1 Interior:
  - .1 ‘100A Series’ by Alumicor Limited or
  - .2 ‘190 Swing Doors' by Kawneer Company Canada Limited.
  - .3 Or approved alternative by Toro Aluminum.
- .2 Exterior:
  - .1 ‘100A Insuldoor’ by Alumicor Limited.
  - .2 ‘260 Insulclad Doors' by Kawneer Company Canada Limited.
  - .3 Or approved alternative by Toro Aluminum.

2.2 **MATERIALS**

.1 General:
- .1 All materials under Work of this Section, including but not limited to, sealants and coatings are to have low VOC content limits.
- .2 Wherever possible, metals used in work of this Section are to contain recycled content.

.2 Aluminum extrusions and channels: ASTM B221 and ANSI H35.1 AA6063 alloy, T6 temper.
- .1 Profile and dimensions: Refer to Contract Drawings.
- .2 Thermal breaks in frame members: Vertically aligned with glazing.

.3 Aluminum sheet: ASTM B209 and ANSI H35.1 AA1100 aluminum alloy, H14 temper, minimum 1.29 mm for sheets less than 610 mm wide and minimum 2.05 mm for sheets of a greater dimension, unless otherwise specified or indicated.

.4 Reinforcements and anchors: ASTM A167, Type 304 to AISI No. 2B finish. Size as shown.

.5 Glass and glazing materials: As specified in Section 08 80 00.

.6 Sealant: ASTM C920, Type S, Grade NS, Class 35; One part silicone, neutral cure sealant, medium modulus; ‘Contractors Weatherproofing Sealant’ by Dow Corning Corporation or ‘Tremsil 400' by Tremco. Primer as recommended by manufacturer.

.7 Frame sealant: Type as recommended by the aluminum work manufacturer.

.8 Joint backing: Closed cell foam polyethylene rod, outsized minimum 30-50% larger than joint width and compatible with joint sealant. Product as recommended by sealant manufacturer.

.9 Anchors, clips, and angles: Extruded aluminum or stainless steel.

.10 Shims and blocking for frame: Rigid plastic, wood is not permitted.

.11 Flashings, closures and trim: 1.0 mm minimum aluminum sheet, finish to match curtain wall extrusion finish.

.12 Screws, bolts and other fasteners: ASTM F738M; Stainless Steel Type 304.

.13 Isolation coating: CAN/CGSB-1.108-M; Bitumastic coating, acid and alkali resistant material.

.14 Door hardware: Manufacturer's standard heavy duty hardware. Provide samples for the Consultant's approval. Hardware to be based on the following:

- .1 Hinging device: extruded aluminum continuous gear hinge or 1 1/2 pair of heavy duty stainless steel butts complete with back up plates.
- .2 Closing device: LCN 4040 Series closers with back up plates.
- .3 Pull handles: 25 mm diameter, anodized aluminum offset pull handles
- .4 Push bars (for doors without panic hardware): 25 mm diameter, anodized aluminum push bar.
- .5 Locking (basic locking): Adams Rite MS1850 Dead Lock with manufacturers standard cylinder on exterior and thumbturn on interior.
- .6 Locking (panic hardware): Von Duprin 33/35A rim panic or Von Duprin 3547 vertical rod panic.
- .7 Hold open devices (where required): Glynn Johnson GJ104S for door stop only applications; Glynn Johnson GJ104H for applications that require both a stop and hold open.

.15 Weatherstripping: Durable, non-absorbing material resistant to deterioration by aging and weathering.

2.3 FABRICATION

.1 Fabricate sections true to detail, free from defects impairing appearance, strength and durability. Fabricate extrusions with sharp, well defined corners.

.2 Fabricate, fit, and secure framing joints and corners accurately, with flush surfaces, and hairline joints. Apply frame sealant at joints for weatherproof seams.

.3 Conceal anchors, reinforcement and attachments from view. Fabricate reinforcement in accordance with design requirements.

.4 Do not expose manufacturer's identification labels on aluminum assemblies.

.5 Fabricate doors and frames complete with internal reinforcements, cut-outs, and recesses to accommodate finish hardware. Reinforce cut-outs to assure adequate strength.

.6 Fabricate closures and trim from aluminum sheet. Form to profile shown. Make weathertight.

.7 Double weatherstrip doors. Install weatherstripping in specially extruded ports and secure to prevent shrinkage or movement.

2.4 **FINISH**

.1 Extrusion finish: 'Duranar XL' by PPG in accordance with AAMA 605.2. Colour to later selection of Consultant.

.2 Panel and sheet finish: As indicated on drawings to match adjacent extrusion finish.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install aluminum doors in accordance with reviewed shop drawings, and manufacturer's written instructions.

.2 Install Work of this Section securely, in correct location, level, square, plumb, at proper elevations, free of warp or twist.

.3 Apply isolation coating at 0.8 mm dry film thickness to prevent corrosive or electrolytic action between dissimilar materials such as aluminum to concrete, masonry, galvanized steel and similar conditions.

.4 Install flashings, closures, and trim pieces.

.5 Automatic door operators to be supplied and installed by Section 08715. Install doors and hardware to manufacturers' written instructions. Clean and adjust hardware for correct performance.

.6 Refer to Contract Drawings for glazing type locations. Install glazing in accordance with Section 08 80 00.

.7 Install aluminum door manufacturer's standard weatherstripping at door frame perimeter. Install weatherstripping throughout entire length and width of doors at jambs and heads.

.8 Install doors and hardware to manufacturers' written instructions. Clean and adjust hardware for correct performance.

.9 Adjust operable parts for correct function.

.10 Remove damaged or unacceptable Products and assemblies from Site and replace to Consultant's acceptance.

.11 Install glass presence markers, in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

3.3 ERECTION TOLERANCES

.1 Tolerances: Non-cumulative.
- .1 Maximum variation from plumb: 1.5 mm/3 m non-cumulative or 12 mm/30 m, whichever is less.
- .2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.
- .3 Vertical and horizontal positions: +/- 3 mm.
- .4 Racking of face: 6 mm, nil in elevation.
- .5 Operable components: Consistent with smooth operation and weatherproof performance.
- .6 Maximum perimeter sealant joint between aluminum and adjacent construction: 13 mm.

3.4 JOINT BACKING AND SEALANT

.1 Prepare substrate surface and mask as recommended by sealant manufacturer.

.2 Install joint backing and sealant at aluminum framing and perimeter joints for weather tight installation in accordance with sealant manufacturer's instructions. Tool sealant. Remove excess sealant.

3.5 CLEANING

.1 Remove labels, protective material, and glass presence markers from prefinished surfaces.

.2 Wash aluminum doors, frames, and screens with solution of mild detergent in warm water, with particular attention to recesses and corners. Wipe surfaces clean and dry.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for the wood doors Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ANSI A208.1, Particleboard.

.2 AWMAC, Architectural Woodwork Manufacturers' Association of Canada. Quality Standards for Architectural Woodwork.

.3 CSA O112 Series, Wood Adhesives.

1.3 **SUBMITTALS**

.1 Shop drawings: Submit shop drawings of wood doors in accordance with Section 01 10 10 indicating detail thicknesses, core construction, veneers, finish, door sizes, quantities, fastenings and finishes.

.2 Samples: Submit the following samples in accordance with Section 01 10 10:
- .1 Two minimum 300 x 300 mm door samples for each type of finish and cut-a-way corners showing construction and materials.
- .2 Grilles for Consultant’s approval of finish and size.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.4 **QUALITY ASSURANCE**

.1 Perform Work in accordance with requirements of AWMAC, Quality Standards for Architectural Woodwork, Premium Grade, except as indicated otherwise.

1.5 **DELIVERY, STORAGE, AND HANDLING**

.1 Deliver, store, and handle wood doors in accordance with the AWMAC Quality Standards amended as follows:
- .1 Wrap wood doors individually in protective wrapping for shipment and Site storage.

.2 Handle wood doors carefully to prevent damage; replace damaged doors.
.3 Store doors flat on a dry, level surface. Ventilate and maintain recommended relative humidity before, during and after installation.

2 Products

2.1 **MATERIALS**

.1 General:
.1 Materials used for Work of this Section are to include, but not be limited to the following criteria:
.1 Regionally sourced materials.
.2 Certified wood.
.3 Low VOC content limits.
.2 Adhesives - Urea-formaldehyde-free glues.
.3 All dimensional lumber and plywood to be FSC certified.
.4 All composite wood and/or agrifibre products (including core materials) and adhesives used to fabricate laminated assemblies used in building must not contain added urea-formaldehyde.
.5 Material to be sourced regionally from within 800 km of jobsite wherever possible.

.2 Wood doors (solid core):
.1 5 ply wood door: 'Series 9300' by Cambridge Door Ltd.; ‘Series 701' by JWS Manufacturing Inc. or approved alternatives from Baillargeon Doors inc. or Lambton Doors.
.2 Core: To ANSI A208.1, density 528 kg/m3 minimum, sanded faces, of thickness to fill void. Extruded particle board cores with voids are not permitted.
.3 Rails:
.1 Top: 38 mm hardwood.
.2 Bottom: 38 mm hardwood.
.4 Stiles
.1 Hinge: 38 mm hardwood edge strip.
.2 Lock: 38 mm hardwood edge strip..2.
.3 Edge detail: AWMAC No.2.
.5 Crossbanding: 1.5 mm thick hardwood veneer.
.6 Door facing: 1.5 mm wood Veneer. Wood species to be selected by the Consultant.

.3 Wood doors (hollow core):
.1 5 ply hollow core doors as manufactured by Cambridge Door Ltd., JWS Manufacturing Inc. or Lambton Doors.
.2 Rails:
.1 Top: 38 mm hardwood.
.2 Bottom: 38 mm hardwood.
.3 Stiles
.1 Hinge: 38 mm hardwood edge strip.

.2 Lock: 38 mm hardwood edge strip.
.3 Perimeter of glazing: 38 mm hardwood.
.4 Edge detail: AWMAC No.2.

.4 Crossbanding: 1.5 mm thick hardwood veneer.
.5 Door facing: 1.5 mm wood Veneer. Wood species to be selected by the Consultant.

.4 Edge finish: To match door facings.

.5 Sliding door hardware: Top hung, aluminum track and components, sliding hardware system consisting of, but not limited to the following components: extruded aluminum upper track, double roller running gear, track stopper, suspension plate and floor mounted guide; 'Hawa Media 70' by Hafele or approved alternative.

.6 Adhesive: CSA O112 Series, Type I; Waterproof.

.7 Grilles: Extruded aluminum door grilles with minimum 50% free area; Door grilles are to be provided where noted and as per mechanical drawings. 'Door Grilles' as manufactured by Hart and Cooley or approved alternative. Provide samples for Consultant's approval.

.8 Door Frames:
.1 Metal door frames in accordance with Section 08 11 13.
.2 Wood door frames in accordance with Section 06 20 00 .

2.2 **FABRICATION**

.1 Fabricate doors to sizes indicated on drawings.

.2 Fabricate doors square, true, and free from distortion waves, ridges or core ghost lines. Factory machine doors for finish hardware and flooring.

.3 Fabricate doors using hot press construction technology. Bond stiles and rails to core using adhesive. Sand for uniform thickness. Laminate door facing and trim, to assembled core in hot press.

.4 Cut and bevel stile edges as follows:
.1 Lock side: 3 mm in 50 mm.
.2 Hinge side: 1.5 mm in 50 mm.

.5 Finish wood doors in factory and deliver to site ready for hanging.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install doors plumb, rigid, square, clear of floor finishes, and with correct rebate opening for door installation.

.2 Conform to requirements of AWMAC Quality Standard, for wood door installation.

.3 Install door grilles plumb and level, where indicated.

3.3 **ADJUSTING AND CLEANING**

.1 Replace the following wood doors:
- .1 Warped more than 3 mm, measured at any point on door, relative to perfectly flat surface.
- .2 Core telegraphing visible at 1500 mm distance, under final Site lighting conditions.

.2 Adjust doors for smooth and balanced door movement.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, tool, equipment and services necessary for sliding closet door work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ANSI A208.1, Particleboard.

1.3 **SUBMITTALS**

.1 Product data: Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating material criteria and characteristics, product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings of closet doors in accordance with Section 01 10 10 indicating detail thicknesses, core construction, veneers, finish, door sizes, quantities, fastenings and finishes.

.3 Samples: Submit two minimum 300 x 300 mm door samples for each type of finish, typical panel, frames and all hardware in accordance with Section 01 10 10.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.4 **DELIVERY, STORAGE AND HANDLING**

.1 Store all fabricated items on Site and in shop under conditions which will ensure that likelihood of damage will be kept to a minimum. Remove protective covering immediately before acceptance.

1.5 **EXTENDED WARRANTY**

.1 Submit a extended warranty for sliding closet door work in accordance with General Conditions, except that warranty period is extended to 2 years from date of Substantial Performance of the Work.
- .1 Warrant against defect workmanship or materials.
- .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **ACCEPTABLE PRODUCT**

.1 Sliding closet door (mirror): 'Stanley Acmetrack Sliding Mirror Door System', distributed by Allmar International, with prefinished steel stiles, rails, tracks and fascia. 5 mm thick mirror panels with vinyl backing, integral pull stile, spring loaded top hanger, and bottom roller incorporating 35 mm nylon wheels. Finish to later selection by Consultant.

2.2 **MATERIALS**

.1 Metal framing: roll formed sheet metal with all exposed and semi-concealed surfaces finished in baked enamel, except cut ends.

.2 Panels: Prepainted particle board to ANSI A208.1, Grade "M1".

.3 Mirror glass: 6 mm thick polished plate or float glass. Mirror backing shall be resistant to sulphur and hydrogen sulphide fumes. Polish and round all corners of mirrors.

2.3 **FABRICATION**

.1 Fabricate doors from specially designed, roll formed steel framing comprising panel frames, head tracks and sill tracks.

.2 Panel stiles and rails shall be constructed of roll formed steel sections, to interlock and be secured with corner connectors. Provide top and bottom bumpers on each vertical style contacting jamb both ends of each panel.

.3 Provide each panel with top mounted rollers fully adjustable after doors have been set into opening. Provide guide track at bottom. Provide neoprene rubber door bumpers.

.4 Use three panels for openings greater than 2440 mm in width.

.5 Fabricate panels rigid, rattle proof, flat.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install in accordance with manufacturer's instructions.

.2 Install doors securely, flat, plumb and level; make necessary adjustments and ensure quiet, trouble free movement of products.

.3 Inspect doors at completion and buff up defects or replace as directed.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for electrically operated overhead coiling doors Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A653/A653M, Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process.

.2 ASTM D523, Test Method for Specular Gloss.

.3 ASTM D822, Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.

.4 CSA C22.1, Canadian Electrical Code, Part 1, Safety Standards for Electrical Installations.

.5 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.

.6 CAN/CSA G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 **DESIGN REQUIREMENTS**

.1 Design for means of fully reversing downward descent of door, if door comes down on an obstruction. Door to cycle closed until obstruction is removed.

1.4 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, limitations, and trouble-shooting protocol.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Elevations, sections, details, materials, operating components, dimensions, gauges, finishes, arrangement of hardware, required clearances, and relationship to adjacent construction.
  - .2 Complete electrical wiring diagrams including electrical schematics and sequence of operation.

.3 Complete engineering design data confirming that Products meet design criteria specified.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Closeout submittals:
- .1 Submit following for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10:
  - .1 Identification: Manufacturing name, type, year, and serial number.
  - .2 Performance criteria and maintenance data.
  - .3 Operating instructions and precautions.
  - .4 Safety precautions.
  - .5 Component parts availability including names and addresses of spare part suppliers.
  - .6 Lubrication schedule indicating lubrication points and type of lubricant recommended.

1.5 QUALITY ASSURANCE

.1 Perform Work of this Section by a company that has a minimum of five years proven experience in the installation of overhead coiling doors of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.

1.6 EXTENDED WARRANTY

.1 Submit a extended warranty for Work of this Section in accordance with General Conditions, except that warranty period is extended to 3 years from date of Substantial Performance of the Work.
- .1 Warrant against failure to meet design criteria and specified requirements.
- .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 ACCEPTABLE PRODUCTS AND MANUFACTURERS

.1 600 Series by Overhead Door Corporation.

.2 Cookson Rolling Service Door by Richards Wilcox.

.3 Rolling Service Door by Wayne Dalton.

2.2 **MATERIALS**

.1 Steel angles, shapes, plates, and similar items: CAN/CSA-G40.20/G40.21-M, Grade 350W.

.2 Galvanized steel sheet: commercial quality to ASTM A653/A653M with Z275 zinc coating. Minimum sheet thickness to be 0.5 mm.

.3 Weather stripping:
- .1 Sills: bulb type full width extruded neoprene weatherstrip.
- .2 Jambs and head: extruded aluminum and arctic grade vinyl weatherstrip to manufacturer's standard.

2.3 **HARDWARE**

.1 Brackets: Fabricated from 6 mm steel plate, with sealed ball bearings on the operating side.

.2 Guides: Fabricated from structural steel, complete with integral windlock bar, of sufficient depth to retain curtain to meet design criteria. Provide vinyl guide weatherstrip on operating side.

.3 Spring counter balance: heavy duty oil tempered torsion spring with manufacturers standard brackets.
- .1 Drum: Die cast aluminum, size as recommended by door manufacturer to suit intended application.
- .2 Shaft: 25 mm diameter solid steel.

.4 Chain operator: Provide for chain hoist operator with cast iron gears or roller chain sprocket.

.5 Hood: Minimum 0.60 mm galvanized steel sheet.

2.4 **ELECTRICAL**

.1 Electrical jack shaft side mounted type operator.

.2 Electrical motors, controller units, remote pushbutton stations, relays and other electrical components: to CSA approval with CSA enclosure type 3.

.3 Power supply: 208V, 3 phase, 60 Hz.

.4 Motor: 1 H.P. minimum, CSA and UL approved, rotary type limit switch, Heavy duty reversing contactor, solenoid disc brake, manual overload relay, with pre-wired, colour-coded control cabinet.

.5 Controller units with integral motor reversing starter, solenoid operated brake 3 heater elements for overload protection, including 3 pushbuttons and control relays as applicable.

.6 Operation: Remote pushbutton stations: surface mounted, in locations indicated on drawings, with "OPEN-STOP-CLOSE" designations on pushbuttons in English.

.7 Arrange automatic closing device to permit manual lifting of curtain for emergency exit after automatic closing with curtain returning to closed position when released.

.8 Connect automatic closing device to fire alarm system.

.9 Safety edge switch:
- .1 Combination roll rubber with limit switches for full length of bottom rail of bottom blade of door, to reverse door to open position when coming in contact with an object on closing cycle.
- .2 Safety edge to operate of air wave technology and shall not rely on pneumatic pressure or electrical contact to operate.
- .3 Operation of safety edge shall not be subject to interferences by temperature, water infiltration, or damage to safety edge.

.10 For jack shaft operators:
- .1 Provide floor level disconnect device to allow for manual operation in event of power failure.
- .2 Equip Operator with:
  - .1 Electrical interlock switch to disconnect power to operator when in manual operation.
  - .2 Built-in chain hoist for manual operation in event of power failure.

.11 Control transformer: for 24 V AC control voltage.

.12 Mounting brackets: galvanized steel, size and gauge to suit conditions.

2.5 FABRICATION

.1 Coiling door curtain interlocking slat sections:
- .1 Roll formed steel, 1.219 mm base metal thickness x 75 mm wide.
- .2 Profile: flat.

.2 Rivet continuous end locks to slat ends.

.3 Provide bottom bar of double equal weight steel angles.

.4 Form guides of metal angles of sections of 6 mm minimum thickness for between jambs installation.

.5 Construct counterbalance assembly of heat treated torsion spring with 25% overload factor. Enclose spring in steel pipe to support door curtain and counterbalance mechanism. Provide ball bearings at rotating points. Provide spring tension adjusting wheel, accessible for setting.

.6 Support counterbalance assembly on 6 mm minimum thickness steel plate brackets, forming end enclosures.

.7 Enclose counterbalance assembly with galvanized steel sheet formed hood.

2.6 **FINISHES**

.1 Prefinish sheet steel: 2 coat factory applied silicone modified polyester conforming to the following:
- .1 Colour: White.
- .2 Specular gloss: 30 units +/- 5 in accordance with ASTM D523.
- .3 Coating thickness: Not less than 25 micrometres.
- .4 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D822 as follows:
  - .1 Outdoor exposure period 1000 hours.
  - .2 Humidity resistance exposure period 1000 hours.

.2 Steel: Hot dip galvanized in accordance with CAN/CSA G164-M.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install doors as shown and in accordance with manufacturer's printed instructions.

.2 Fasten door guides and associated components securely to walls using anchors where required.

.3 Supply and install all necessary steel, brackets, clips, angles, supports, anchors, etc., which may be required to support the door and mechanisms.

.4 Erect door true to line with all hardware carefully and neatly applied. Make all necessary adjustments and leave door in proper working order.

.5 Install electrical motors, controller units, pushbutton stations, relays and other electrical equipment required for door operation.

.6 Installation includes electric wiring from power supply located near door.

.7 Install chain drop in location indicated.

.8 Adjust door operating components to ensure smooth opening and closing of doors.

3.3 **ERECTION TOLERANCES**

.1 Maintain dimensional tolerances and alignment with adjacent work and as follows:
- .1 Maximum variation and alignment from plum: 1.5 mm.
- .2 Maximum variation from level: 1.5 mm.
- .3 Longitudinal or diagonal warp: Plus or minus 3 mm per 3 m straight edge.

3.4 **OPERATION SCHEDULE**

.1 Door controls located on each side of door.

.2 Operator on emergency power and also manual chain hoist operation.

.3 On closed position bolt locking complete with electric interlock.

3.5 **FIELD QUALITY CONTROL**

.1 Testing: Test operate door and demonstrate the operation of same to the satisfaction of the Consultant.

.2 Adjust door operating components to ensure smooth opening and closing of doors.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for sectional overhead door Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

.2 ASTM D523, Test Method for Specular Gloss.

.3 ASTM D822, Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.

.4 CSA C22.1, Canadian Electrical Code, Part 1, Safety Standards for Electrical Installations.

.5 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.

.6 CAN/CSA G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.

.7 CSA S136.1-M, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.

.8 CAN/CGSB 1.181, Coating, Zinc-Rich, Organic, Ready Mixed.

1.3 **DESIGN REQUIREMENTS**

.1 Provide a 38 mm thermally broken insulated flush overhead door, electrically operated complete with safety edge.

.2 Design door assembly to withstand wind loads in closed position of 1 kPa positive 0.6 kPa negative, with operators to function against 0.4 kPa wind load. Maximum deflection under full design load to be 1/240 of opening width.

.3 Calculate properties of steel sections and allowable stresses used in determination of structural performance in accordance with CSA S136.1-M.

.4 Design door assembly to withstand minimum 100,000 cycles per annum, and 20 years total life cycle. Design door panel assemblies with thermal insulation factor minimum 2.32 RSI.

1.4 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standards, characteristics, limitations, and trouble shooting protocol.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Elevations, materials, sections and details, operating components, dimensions, gauges, glazing, hardware, accessories, finishes, and service rating.
  - .2 Complete electrical wiring diagrams including electrical schematics and sequence of operation.
  - .3 Complete engineering design data to confirm that door meets design criteria specified.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Closeout submittals:
- .1 Submit following for each Product for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10:
  - .1 Identification: Manufacturing name, type, year, and serial number.
  - .2 Performance criteria and maintenance data.
  - .3 Operating instructions and precautions.
  - .4 Safety precautions.
  - .5 Component parts availability including names and addresses of spare part suppliers.
  - .6 Lubrication schedule indicating lubrication points and type of lubricant recommended.

1.5 **EXTENDED WARRANTY**

.1 Submit a extended warranty for Work of this Section in accordance with General Conditions, except that warranty period is extended to 5 years.
- .1 Warrant against failure to meet design criteria and specified requirements.
- .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **ACCEPTABLE PRODUCTS AND MANUFACTURERS**

.1 ‘Thermacore 591' by Overhead Door Company.

.2 ‘Thermatite T150' by Richards Wilcox.

.3 ‘Thermospan 150' by Wayne-Dalton Corp.

2.2 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, paints are to have low VOC content limits.

.2 Steel angles, shapes, plates, and similar items: CAN/CSA-G40.20/G40.21-M, Grade 350W.

.3 Galvanized steel sheet: commercial quality to ASTM A653/A653M with Z275 zinc coating. Minimum sheet thickness to be 0.5 mm.

.4 Insulation: Rigid polyurethane to meet design requirements.

.5 Vision panels: 305 mm x 610 mm dual acrylic thermal glazing set in moulded gasket.

.6 Weather stripping:
.1 Sills: bulb type full width extruded neoprene weatherstrip.
.2 Jambs and head: extruded aluminum and arctic grade vinyl weatherstrip to manufacturer's standard.

.7 Galvanized primer paint: Inorganic zinc rich primer. For use on galvanized fabrications where touch up is to remain unpainted in finished work; Carbozinc 11WB by Carboline Company, Catha-Coat 305 by Devoe Coatings or Zinc Clad XI by Sherwin Williams.

.8 Electrical work: In accordance with Division 26 - Electrical.

2.3 **HARDWARE**

.1 Track: standard lift hardware with 75 mm size minimum 2.3 mm core thickness galvanized steel track.

.2 Track Supports: 2.3 mm core thickness continuous galvanized steel angle track supports.

.3 Spring counter balance: heavy duty oil tempered torsion spring with manufacturers standard brackets.
.1 Drum: Die cast aluminum, size as recommended by door manufacturer to suit intended application.
.2 Shaft: 25 mm diameter solid steel.

.4 Top roller carrier: galvanized steel minimum 2.3 mm thick, adjustable.

.5 Rollers: full floating, grease packed hardened steel, ball bearing minimum 75 mm diameter, stamped tire.

.6 Roller brackets: adjustable, galvanized steel, minimum 2.5 mm thick.

.7 Hinges: standard duty industrial 2.3 mm thick galvanized steel.

.8 Cable: minimum 4 mm diameter multi-strand galvanized steel aircraft cable with a safety factor of 8:1.

.9 Bar-latch (manual): across the door bar latch complete with night lock and interior handle.

.10 Chain Operator Unit: Hand-chain actuated unit of type appropriate for the track type used. Furnish endless chain of sufficient length to come within 600mm [2'] of floor and furnish a wall mounted keeper. Design gear reduction unit to reduce pull required on the hand chain to 35 pounds maximum.

2.4 **ELECTRICAL**

.1 Electrical jack shaft side mounted type operator. Operator to include motors, speed reducers with all gears running in oil, sheaves, racks, levers, cables and brake, disconnect switches, reversing starters, controls, and all conduit and wiring to make all connections required to complete the Work.

.2 Provide operator with floor level disconnect device to allow for manual operation in event of power failure. Equip operator with electrical interlock switch to disconnect power to operator when in manual operation and Built-in chain hoist for manual operation in event of power failure.

.3 Electrical motors, controller units, remote pushbutton stations, relays and other electrical components: to CSA approval with CSA enclosure type 1.

.4 Power supply: As indicated on electrical drawings.

.5 Motor: Minimum 0.375 kW to maximum 0.560 kW to suit design.

.6 Operation: Remote pushbutton stations, surface mounted, in location shown, with "OPEN-STOP-CLOSE" designations on pushbuttons in English.

.7 Safety switch: combination roll rubber with limit switches for full length of bottom rail of bottom section of door, to reverse door to open position when coming in contact with object on closing cycle.

.8 Door speed: 300 mm per second.

.9 Control transformer: for 24 V AC control voltage.

2.5 **FABRICATION**

.1 Verify dimensions of existing Work before commencing fabrications and report discrepancies to Consultant.

.2 Fabricate Work in accordance with Contract Drawings and reviewed shop drawings. Fabricate, fit and assemble Work in shop where possible. Provide two vision panels.

.3 Fabricate Work free from defects impairing function, appearance, strength and durability.

.4 Fabricate panel frames in a continuous box frame with vertical stiffeners at 600 mm centres.

.5 Fabricate doors from prepainted steel stock.

2.6 **FINISHES**

.1 Prefinish sheet steel: 2 coat factory applied silicone modified polyester conforming to the following:
- .1 Colour: To be selected later by Consultant.
- .2 Specular gloss: 30 units +/- 5 in accordance with ASTM D523.
- .3 Coating thickness: Not less than 25 micrometres.
- .4 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D822 as follows:
  - .1 Outdoor exposure period 1000 hours.
  - .2 Humidity resistance exposure period 1000 hours.

.2 Steel: Hot dip galvanized in accordance with CAN/CSA G164-M.

3 Execution

3.1 **INSTALLATION**

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

.2 Use anchorage devices to securely fasten unit assembly to wall construction and building and building framing without distortion or stress.

.3 Fit and align assembly including hardware; level and plumb, to provide smooth operation. Install door to fit tight at all edges of jambs and heads of frames.

.4 Install operator including electrical motors, controller units, pushbutton stations, relays and other electrical equipment required for door operation. Power supply to door and wiring shall be provided by Division 26 - Electrical. Comply with requirements of Division 26 - Electrical, CSA C22.1 and Ontario Hydro Electrical Safety Code.

.5 Lubricate and adjust door operating components to ensure smooth opening and closing of doors.

.6 Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 92 00.

.7 Touch-up steel doors with primer where galvanized finish damaged during fabrication.

.8 Adjust weatherstripping to form a weathertight seal.

3.2 **ERECTION TOLERANCES**

.1 Maintain dimensional tolerances and alignment with adjacent work.

.2 Maximum variation and alignment from plumb: 1.5 mm

.3 Maximum variation from level: 1.5 mm

.4 Longitudinal or diagonal warp: Plus or minus 3 mm per 3 m straight edge.

3.3 **FIELD QUALITY CONTROL**

.1 Testing: Test operate door and demonstrate the operation of same to the satisfaction of the Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for sliding automatic door Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 AAMA 2603, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.

.2 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels - Series: Components, Coatings and Finishes.

.3 ANSI H35.1M Alloy and Temper Designation Systems for Aluminum (Metric).

.4 ASTM E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.5 ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

.6 CAN/CGSB-1.108-M, Bituminous Solvent Type Paint.

.7 CAN/CGSB-69.26, Power-Operated Pedestrian Doors.

1.3 **DESIGN REQUIREMENTS**

.1 Design sliding door system in accordance with following Climatic Design Data for Toronto contained in Ontario Building Code (OBC):
.1 Design Temperature: January 1%, July 2 1/2% .
.2 Wind (Hourly Wind Pressures): 1 in 50 year occurrence.
.3 Earthquake: Seismic Data as listed.

.2 Restrict air infiltration/exfiltration, through sliding door system to 3.05×10^{-4} $m^3/s/m^2$ at reference pressure differential of 75 Pa, when measured in accordance with ASTM E283.

.3 Design and detail controlled drainage path to actively discharge water, which enters into, or forms within, sliding door system to exterior; design to prevent accumulation or storage of water within sliding door system, and to prevent water from entering interior. No water leakage permitted when tested in accordance with ASTM E331.

.4 Design and detail air and vapour retarder, insulation and rainscreen Products and assemblies into a continuous and integrated envelope. Optimize design to align envelope layers and to minimize thermal bridges.

.5 Design sliding door system to accommodate following without producing detrimental effect on sliding door system or its components:
- .1 40 degrees C range of cyclic, daily thermal swing for component expansion and contraction.
- .2 Dynamic, cyclic loading and release of loads such as wind loads.
- .3 Movement of supporting structure such as live, dead load, and creep deflections, seismic load and sway displacement and similar items.

.6 Design to prevent excessive deflection and permanent or progressive glazing displacement. Restrict horizontal and vertical mullion deflection to L/175 maximum (under uniformly distributed positive load), and do not exceed 10 mm total, regardless of span.

.7 Design, fabricate, and supply anchorage inserts for installation as part of other parts of the Work. Design anchorage assemblies to accommodate construction and installation tolerances.

.8 Design sliding door system to accommodate 19 mm vertical deflection in supporting structure.

.9 Design automatic door equipment to accommodate traffic loading of 100,000 cycles.

.10 Design sliding automatic doors system with power and control voltage electrical requirements of single phase, 120V, 60Hz.

.11 Safety design criteria:
- .1 Design to prevent initiation of close cycle when failure of threshold presence detectors occurs.
- .2 Maximum closing force: 133 N factory set.

.12 System safety features:
- .1 Emergency exit break-away: Design sliding door break-away hardware on active leafs only, in direction of egress, under 90 N factory set, horizontal force field adjustable.
- .2 Motion/presence detectors: Design to detect moving (approaching or departing) and motionless people, and moving objects, both sides of sliding automatic door.
- .3 Threshold presence detector: Design to prevent sliding doors from closing when door opening is occupied.
- .4 Back-up system: 3 photocell detectors across doorway opening.
- .5 Detection systems failure defaults: Default to hold-open position in case of system's failure.

.13 Design motion/presence detectors for two way traffic, motion detectors and active infrared presence sensors, designed to control the opening, hold open, and closing cycles of sliding automatic doors, with fully adjustable detection pattern and sensitivity adjustments in accordance with CAN/CGSB-69.26, in high impact, weather tight housing.

.14 Design detectors which are capable of distinguishing false impulse events, including rain, snow, and which are unaffected by temperature changes, ambient light, or excessive traffic flow.

.15 Sequence of operation (normal): Program following operating sequences for On key switch position.
- .1 Motion detector activation initiates door opening cycle, threshold presence detectors are activated, and timer is re-set.
- .2 After preset time has elapsed, door close cycle is initiated, threshold detectors remain activated till fully closed, and motion detectors, (both sides), continue to monitor for movement toward door.
- .3 If sliding door encounters resistance or obstruction while closing, door returns to fully open position and re-activates timer leading to closing cycle.
- .4 Door security system remains inactive

.16 Program following operating sequences for Exit Only key switch position:
- .1 Sequences identical to On position, except pedestrian entrancing is disallowed.

.17 Program following operating sequences for Maintenance key switch position:
- .1 Sliding door becomes inoperative (activation is not possible) and sliding door leaves can slide freely.
- .2 Door security system remains inactive.

.18 Program following operating sequences for Off key switch position:
- .1 Sliding door panels close when the motion and threshold detectors report door is clear, and remain in closed position to facilitate manual locking. Detectors are de-energized.
- .2 Door security system includes sliding automatic door.

1.4 SUBMITTALS

.1 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Plans, sections, and details.
  - .2 Products and glazing types.
  - .3 Finishes.
  - .4 Anchorage inserts, system installation tolerances
  - .5 Section and hardware reinforcement, anchorage, assembly fixings
  - .6 Detailing, locations, and allowances for movement, expansion, contraction.
  - .7 Path of cavity drainage and air pressure equalization.

.8 Relationship of doors, frames, track, hardware and operating components to adjacent construction. Include detailed descriptions and catalogue cuts of specified door controls.

.2 Submit complete electrical wiring diagrams including electrical schematics and sequence of operation for doors.

.3 Submit complete design calculations for the doors to demonstrate conformance with design requirements.

.2 Samples:

.1 Submit following samples in accordance with Section 01 10 10:

.1 Two 300 mm long sliding door extrusion .

.2 Two 300 mm square insulating glass unit.

.3 Two 300 mm square corner samples of each type door and frame.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.

.1 Indicate cost, post consumer and pre-consumer recycled content for each product.

.2 Identify each regionally extracted and manufactured material, its source and cost.

.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certificates:

.1 Submit CSA, ULC, or Ontario Hydro approvals for sliding automatic door systems.

.5 Close-out submittals:

.1 Submit following for each Product, incorporated into Operations and Maintenance Manual in accordance with Section 01 10 10.

.1 Printed operation instructions and maintenance data for doors with as-built straight line wiring diagrams illustrating electrical connections and control wiring.

.2 Submit lubrication chart indicating lubrication points and type of lubricant recommended for equipment.

1.5 QUALITY ASSURANCE

.1 Perform Work of this Section by a company which supplies and installs Work of this Section. Execute installation by manufacturer's trained and certified installation specialists.

1.6 EXTENDED WARRANTY

.1 Submit a extended warranty for sliding automatic door Work In accordance with General Conditions, except that warranty period is extended to 5 years.

.1 Warrant that sliding automatic door systems will remain fully operational and functional, assuming normal wear and tear and maintenance.

.2 Coverage: complete replacement including affected adjacent Work.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS AND SYSTEMS:**

.1 All materials under Work of this Section, including but not limited to, sealants and coatings are to have low VOC content limits.

.2 Acceptable manufacturers and systems include:
- .1 ‘Unislide OC2' by Besam complete with Ultraview sensor.
- .2 ‘Model 2000B Type 310' by Horton Automatics complete with C-1827 sensor.
- .3 ‘Gyrotech 1175-04' by Nabco complete with Acusensor sensor.

.3 Hardware:
- .1 Complete perimeter weather stripping system.
- .2 Back-to-back cylinder cam lock between meeting stiles of sliding doors.
- .3 On - Exit only - Maintenance - Off, four position, key switch located on the door stile of each door.
- .4 Surface mounted threshold with slotted door guides.

.4 Aluminum extrusions: ANSI H35.1 AA6063, T5 temper alloy.

.5 Aluminum finish:
- .1 Exterior finish: ‘Duranar (XL) 3-Coat Paint System’ by PPG in accordance with AAMA 2605. Colour: To be selected by Consultant.
- .2 Interior finish: Duracron 100 Paint System’ by PPG in accordance with AAMA 2603. Colour: To be Selected by Consultant.

.6 Glazing: In accordance with Section 08 80 00.

.7 Temporary glass presence markers: Easily removable, non-residue depositing.

.8 Permanent warning decal: 150 mm diameter, self adhesive vinyl, red colour decal with white lettering reading CAUTION SLIDING DOOR.

.9 Glazing tape: Preformed and pre-shimmed tape, paper release, colour as selected by Consultant.

.10 Setting blocks: Neoprene, 80-90 Shore A Durometer hardness, 100 mm long x 6 mm high x rebate width.

.11 Back-up system: Three photocell presence detectors concealed in sidelight stiles and located at 150 mm, 610 mm, and 1500 mm A.F.F across threshold.

.12 Anchors, clips, blocking, and angles: AISI Type 304 stainless steel, 2B mill finish.

.13 Screws, bolts and other fasteners: AISI Stainless Steel Type 304.

.14 Isolation coating: CAN/CGSB-1.108-M; Bitumastic coating, acid and alkali resistant material.

.15 Foam insulation: One component polyurethane foam for installation within closures and fillers; Enerfoam by Dow Chemical Canada Inc.

.16 Frame sealant: Type as recommended by the sliding automatic door manufacturer.

.17 Lubricant: Type as recommended by manufacturer.

.18 Conduit: In accordance with Division 26 for rigid and flexible conduit and accessories.

.19 Wiring: In accordance with Division 26 .

.20 Airseal transition membrane: 'Blueskin SA' by Bakor, 'Sopraseal Stick 1100' by Soprema Inc. or 'Air-Shield by W. R. Meadows. Membrane to come complete with applicable primer.

.21 Joint backing: Product as recommended by sealant manufacturer.

.22 Sliding door sealant: Two-part polyurethane sealant, Dymeric by Tremco Ltd. or Sikaflex 2C-NS by Sika Inc. Colour: As selected by Consultant.

2.2 **FABRICATION**

.1 Verify dimensions of existing Work before commencing fabrication and report discrepancies to Consultant. Commencement of work means acceptance of existing conditions.

.2 Fabricate sections true to detail, free from defects impairing appearance, strength and durability. Fabricate extrusions with sharp, well defined corners.

.3 Fabricate, fit, and secure framing joints and corners accurately, with flush surfaces, and hairline joints. Fabricate frame sealant at joints for weatherproof seams.

.4 Fabricate to conceal anchors and attachments from view. Fabricate concealed reinforcement in accordance with design requirements.

.5 Do not expose manufacturer's identification labels on sliding automatic door assemblies.

.6 Fit and mitre corners and joints accurately fitted and securely jointed together. Apply back-up sealants on the inside of aluminum frame joints.

.7 Fabricate doors and frames complete with internal reinforcements, cutouts, recesses.

.8 Supply and install transom framing complete with glazing.

.9 After fabrication, apply protective strippable coating to prefinished aluminum surfaces. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Do not remove before final cleaning of building.

3 Execution

3.1 **EXAMINATION**

.1 Verify conditions and dimensions of previously installed Work upon which Work of this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install sliding door system in accordance with reviewed shop drawings and manufacturer's instructions.

.2 Install Work of this Section securely, in correct location, level, square, plumb, at correct elevations, free of warp or twist.

.3 Apply isolation coating at 0.8 mm dry film thickness to prevent corrosive or electrolytic action between dissimilar materials such as aluminum to concrete, masonry, galvanized steel and similar conditions.

.4 Install flashings, closures, and trim pieces.

.5 Fill voids between aluminum framing and adjacent construction with foam insulation.

.6 Install glass presence markers, in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

.7 Install manufacturer's standard weatherstripping at door frame perimeter. Install weatherstripping throughout the full length and width of the doors at jambs and heads.

.8 Adjust operable parts for correct function.

.9 Remove damaged or unacceptable Products and assemblies from Site and replace to acceptance of Consultant.

.10 Install permanent warning decal onto upper lites of both sliding doors and fixed sidelights.

3.3 **ERECTION TOLERANCES**

.1 Maximum variation from plumb: 1.5 mm/3 m non-cumulative.

.2 Maximum misalignment of two adjoining members abutting in plane: 0.4 mm.

.3 Maximum perimeter sealant joint between sliding door system and adjacent construction: 13 mm.

3.4 **GLAZING PERIMETER AIRSEAL**

.1 Install glazing perimeter airseal at perimeter of each insulating glass unit to achieve an airseal from IG unit to sliding door frame. Do not obstruct path of cavity drainage and air pressure equalization.

3.5 **AIRSEAL TRANSITION MEMBRANE**

.1 Install primer and airseal transition membrane in accordance with manufacturer's instructions.

.2 Overlap airseal transition membrane 75 mm minimum and lap in direction of waterflow.

.3 Coordinate airseal transition to adjacent parts of Work.

3.6 **ELECTRICAL WORK**

.1 Install rigid steel conduit and wiring:
- .1 To nearest power supply junction boxes and make the connection.
- .2 For control and activation devices

.2 Install approach motion/presence detectors and adjust in accordance with sliding automatic door manufacturer's instructions.

3.7 **JOINT BACKING AND SLIDING DOOR SEALANT**

.1 Install joint backing and sliding door sealant at both sides of sliding automatic door frame perimeter for an air and weather tight installation.

3.8 **FIELD QUALITY CONTROL**

.1 Lubricate moving parts before test operations, include greasing/lubrication of sprockets, bearings, cables, and guides.

.2 Test operate sliding automatic doors and demonstrate operation to acceptance of Consultant.

3.9 **CLEANING**

.1 Remove strippable, protective coatings, temporary labels, and glass presence markers, clean frames and glazing free of residue.

.2 Clean and polish glass and metal surfaces, both interior and exterior.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, Labour, Products, equipment and services necessary for revolving door Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 AAMA 611, Voluntary Standards for Anodized Architectural Aluminum.

.2 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

.3 ASTM A269, Specification for Seamless and Welded Austenitic Stainless Steel Sanitary Tubing for General Service.

.4 CAN/CGSB-19.13-M, Sealing Compound, One-Component, Elastomeric, Chemical Curing.

.5 CAN/CSA G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.

.6 CAN/CSA G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 **DESIGN REQUIREMENTS**

.1 Take responsibility for design, function and performance of revolving door, frames, deck, and adjoining screens.

.2 Design revolving doors with full heigh stainless steel vertical push bars fastened at the top and bottom stiles.

.3 Design revolving door enclosure with curved glass panels. Ensure enclosure has sufficient space for HVAC piping.

.4 Design revolving door enclosure with stainless steel rolled rectangular tube supports at base of exterior portion of enclosure walls.

.5 Design and fabricate steel supports, brackets and anchorage devices so that when installed they will compensate for unevenness and dimensional differences in structure to which they will be secured, will allow full expansion and contraction of framing members without causing pressure and tension within framing members as a result of such expansion and contraction, and will adequately sustain themselves, the framing and superimposed wind and rain loads, and additional loads applied by installation of glass above revolving door.

.6 Reinforce framing sections as required so that deflection will not exceed L/240 of clear span under a loading of 1.5 kPa (32 lbs/sq.ft.) and wind loading based on Ontario Building Code, 30 year return.

1.4 **SUBMITTALS**

.1 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Elevations, sections, details, materials, operating components, dimensions, gauges, finishes and relationship to adjacent construction.

.2 Samples:
- .1 Submit following samples in accordance with Section 01 10 10.
  - .1 Two 300 x 300 mm samples of corner detail showing materials, and reinforcement for hardware.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Closeout submittals:
- .1 Submit following for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10:
  - .1 Identification: Manufacturing name, type, year, serial number, number of units, capacity, and identification of related systems.
  - .2 Performance criteria and maintenance data.
  - .3 Component parts availability including names and addresses of spare part suppliers.

1.5 **QUALITY ASSURANCE**

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in the installation of units of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.

.2 Retain a Professional Engineer, licensed in Province of Ontario, with experience in revolving door Work of comparable complexity and scope, to perform following services as part of Work of this Section:
- .1 Design of supports and revolving door.

.2 Review, stamp, and sign fabrication and erection shop drawings, design calculations.

1.6 **DELIVERY, STORAGE, AND HANDLING**

.1 Cover exposed metal surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping doors and frames to job site.

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

.3 Temporarily mark each light to indicate presence of glass.

.4 Replace defective, damaged or broken glass due to faulty manufacture, setting, handling or storage carried out under work of this Section. Defective glass shall be as defined in CAN/CGSB-12.3-M.

1.7 **EXTENDED WARRANTY**

.1 Submit a extended warranty for revolving door Work in accordance with General Conditions, except that warranty period is extended to 5 years:
.1 Warrant against failure to meet design criteria and requirements.
.2 Warrant that the revolving door, including operating mechanisms, are warranted against defects and malfunction under normal usage
.3 Coverage: Complete replacement including affected adjacent Work.

.2 Manufacturer's Warranty: Provide panel manufacturer's written warranty naming Owner as beneficiary and covering failure of factory-applied exterior finish on aluminum work within the warranty period; warrant finish per AAMA 2604 for colour fade less than 5 units, maximum chalk rating of 8, and greater than 30% gloss retention. Warranty period for finish: 5 years from date Work is certified as substantially performed.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 This specification is written on the basis of a C.J. Rush, 4 Wing Model, 1500 Series with extruded centre shaft or approved alternative by Besam, or Crane. Specified manufacturer’s products establish the minimum acceptable standards for the work of this Section. Revolving doors assemblies of other manufacturer’s shall exceed specified manufacturer’s standards.

2.2 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, coatings, sealants, and grouts are to have low VOC content limits.

.2 Aluminum extrusions: Aluminum Association alloy AA6063-T5 or T6. 3.2 mm thick.

.3 Sheet aluminum: Aluminum Association alloy 3003-H14.

.4 Steel sections: to CAN/CSA G40.20/G40.21, Grade 300W, hot dip galvanized with minimum zinc coating of 275 g/sq.m. (1.25 oz/sq.ft.) to CAN/CSA G164.

.5 Stainless steel sheet and plate: ASTM A167, Type 316, finish to AISI No. 4. Size as shown or required by design.

.6 Stainless steel tubing: ASTM A269, Type 316, to AISI No. 4 finish. Size as shown or required by design.

.7 Tempered curved low iron glass: In accordance with Section 08 80 00.

.8 Additional Glazing: In accordance with Section 08 80 00.

.9 Fasteners: stainless steel, self-tapping.

.10 Isolation coating: alkali resistant bituminous paint or epoxy resin solution.

.11 Spacer shims and setting blocks: neoprene, EPDM, or oil resistant rubber as approved by glass manufacturer.

.12 Compression gaskets: PVC, neoprene or EPDM dry glazing gasket to suit aluminum extrusions.

.13 Sealant: low modulus one component silicone sealant qualifying to CAN/CGSB-19.13-M. Provide primer.

.14 Weatherstripping for revolving door: door wings and inner stiles; single reinforced rubber sweep. Wing head and outer stiles; single reinforced rubber sweep with outer 32 mm wide felt rubbing strip, double sewn along entire length.

.15 Operating mechanism for revolving door (Manual): Floor mounted mechanical speed control. Free wheeling unit which is adjustable between 8 and 12 RPM.

.16 Hardware reinforcements: minimum 2.8 mm (0.11") thick aluminum or stainless steel.

.17 Glazing stops: minimum 1.5 mm aluminum with finish to match adjacent surface.

.18 Insulation: semi-rigid glass fibre board, "AF530" manufactured by Owens Corning Canada Inc., or approved alternative.

.19 Grout: non-shrink, non-metallic grout, pre-mixed "M-Bed" manufactured by Sika Canada Inc., or "Masterflow 713" by Degussa Chemical Company, or "V-3" by W.R. Meadows of Canada Ltd.

2.3 **FABRICATION**

.1 Shop fabricate and assemble revolving door, balanced doors and framing work with various parts or assemblies ready for erection at building. Trial fit work which cannot be shop assembled to ensure proper and expeditious field assembly.

.2 Fabricate doors and frames of extruded aluminum shapes with well defined corners and reinforced with concealed structural steel or aluminum members where required. Include aluminum canopy, curved and straight glass enclosures, glass sidelights, and metal side panels.

.3 Work shall include all aluminum cover and closure plates, trim, fixings, clips, galvanized steel and other related items, as required for a complete installation.

.4 Make allowances for deflection of structure to ensure that structural loads are not transmitted to revolving door, balanced doors and frame work.

.5 Provide concealed structural steel or aluminum reinforcement as required for adequate strength, stiffness and connections.

.6 Provide sufficient adjustment in anchorage system to permit correct and accurate alignment. After adjustment, positively lock anchorage devices in manner to preclude movement once alignment has been achieved.

.7 Accurately fit intersecting members to flush hairline weathertight joints. Finish shall match adjacent surface finish.

.8 Conceal all fastenings.

.9 Accurately form cut-outs, recesses, mortising or milling required for finishing hardware in accordance with hardware templates and adequately reinforce with aluminum or galvanized steel plates.

.10 Apply isolation coating to metals in contact with dissimilar metals and concrete.

.11 Manufacturer's nameplates on doors and frames are not permitted.

2.4 **REVOLVING DOOR**

.1 Construct door 32 mm thick, of porthole extrusions with minimum wall thickness of 3.2 mm.

.2 Door stiles nominal 40 mm wide.

.3 Top rail nominal 73 mm high.

.4 Bottom rail nominal 73 mm high.

.5 Fabricate door wings to collapse and fold to emergency exit position when pressure of not less than 445N (100 lbf) is applied to outer door stile at push plate height.

.6 Visible collapsing mechanisms on wings or centre shaft are not permitted.

.7 Provide curved glass door enclosure. Fabricate enclosure units 38 mm wide with nominal 100 mm high bottom rails and corner posts as detailed.

2.5 **DOOR HARDWARE**

.1 Provide full height stainless steel vertical push bars fastened at the top and bottom stiles for each wing of revolving door. Include stainless steel spacers and concealed fasteners.

.2 Provide sweeps to revolving door wings, heads, sills and stiles.

.3 Receive and install master keyed cylinder locks from finish hardware contractor and install to bottom rail of 2 wings of revolving door.

2.6 **CANOPY AND DRUM CONSTRUCTION**

.1 Construct prefinished aluminum ceiling and roof and vertical drum panels for canopy. Include all required steel plates, supports and formed sheet steel sections, except structural steel channels and posts which are provided under work of a separate contract.

.2 At exterior location reinforce canopy as required to support wind uplift and minimal snow load. Slightly slope top from centre to outer edges.

.3 Ensure completely watertight construction of canopy.

.4 Provide accurate cut-outs in canopy for installation of grilles and lighting fixtures by Divisions 22 and 26.

.5 Provide minimum 50 mm thick insulation at bottom and sides of canopy.

2.7 **FINISHES**

.1 Exterior and interior finish: Clear anodized or specified colour to AAMA 611 per Aluminum Association Designation System for Aluminum Finishes AA-M12C22A31.

.2 Panel and sheet finish: As indicated on Exterior Finish Schedule.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Unless otherwise specified, install doors, frame, canopy and enclosure system complete in strict accordance with manufacturer's printed instructions and reviewed shop drawings.

.2 Install work plumb, square, level, free from warp, twist and superimposed loads. Shim and grout revolving door assembly as necessary.

.3 Do not use wood for shimming or blocking.

.4 Secure work adequately and accurately in required position, in manner not restricting thermal movement. Make all provisions for structural movement. Final anchor settings after alignment.

.5 Conceal all fixings.

.6 Install all hardware, including operating mechanisms and operators for doors. Grout in floor mounted revolving door operating mechanism.

.7 Install all related covers and trim pieces using concealed fasteners. Where indicated, install framing into recesses.

.8 Test and adjust operable parts for correct function.

.9 Provide all compatible materials necessary for the installation of revolving entrance door system and related components to maintain undamaged integrity and continuity of air barrier system at required air barrier locations within revolving door system and between revolving door system and adjoining building components.

3.3 **GLAZING**

.1 Prepare doors and frames to accommodate glass and glazing method.

.2 Glaze doors in strict accordance with manufacturer's instructions to provide weathertight installation to Consultant's complete satisfaction. Laid-in gaskets not acceptable.

.3 Leave 6 mm space between edge of frame and revolving door enclosure. Glaze joint with clear structural quality silicone sealant.

.4 Glaze vertical joints of abutting glass to glass glazing units only, using structural silicone sealant which will be exposed in the final assembly.

.5 All glazing materials used in conjunction with each other must be compatible.

3.4 **CAULKING**

.1 Seal joints between members of aluminum work and between aluminum work and other building components with compatible sealant to provide weathertight seal at outside and visual seal at inside. Ensure continuity of air barrier/vapour retarder with adjacent construction and systems.

.2 Apply sealant in accordance with manufacturer’s written instructions and sealant manufacturer's printed instructions. Conceal sealant within the aluminum work, except where exposed use may be permitted by Consultant.

3.5 **ADJUSTMENT**

.1 Remove and replace improperly installed units and damaged units not acceptable to Consultant.

3.6 **CLEANING**

.1 Upon completion of work of this Section, thoroughly clean work on both exterior and interior surfaces and leave work free from grease, dirt, dust, labels, fingerprints and other foreign materials.

.2 Use only cleaning materials recommended by door and glass manufacturer.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, tool, equipment and services necessary for curtain wall in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels - Series: Components, Coatings and Finishes.

.2 AAMA CW-10, Care and Handling of Architectural Aluminum from Shop to Site.

.3 ANSI H35.1M, Alloy and Temper Designation Systems for Aluminum (Metric).

.4 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

.5 ASTM B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.6 ASTM B221M, Specification for Aluminum-Alloy Extruded Bars, Rods, Wires, Profiles and Tubes.

.7 ASTM C920, Specification for Elastomeric Joint Sealants.

.8 ASTM E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.9 ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

.10 ASTM F738M, Specification for Stainless Steel Metric Bolts, Screws, and Studs.

.11 CAN/CGSB 1.108-M, Bituminous Solvent Type Paint.

.12 CAN/ULC S702, Thermal Insulation, Mineral Fibre, for Buildings.

1.3 **DESIGN REQUIREMENTS**

.1 Design curtain wall in accordance with following Climatic Design Data for Toronto contained in the Ontario Building Code:
  .1 Design temperature: January 1%, July 2 1/2% .
  .2 Hourly wind pressures: 1 in 50 year occurrence.

.2 Design curtain wall to accommodate following without producing detrimental effect:
  .1 Cyclic 40°C daily thermal swing of components.

.2 Cyclic, dynamic loading and release of loads such as wind loads.
.3 13 mm vertical deflection in supporting structure and movement of supporting structure due to live, dead load, and creep or deflections, seismic load, sway displacement and similar items.

.3 Design to prevent accumulation of condensate on interior side of curtain wall framing under the following service conditions:
.1 Interior temperature: 25°C.
.2 Exterior temperature: -20°C.
.3 Interior RH: 35%.

.4 Restrict air infiltration/exfiltration, through curtain wall in accordance with ASTM E283 at pressure differential as indicated:
.1 Curtainwalls and entrance assemblies: 0.0003 $m^3/s\ m^2$ at differential of 300 Pa.
.2 Doors (per door): 2.78 m^3/h m per linear metre of crack at differential of 75 Pa.

.5 Design and detail controlled drainage path to actively discharge water, which enters into or forms within curtain wall, to exterior; prevent accumulation or storage of water within curtain wall. Prevent water from entering interior when tested in accordance with ASTM E331.

.6 Design and detail air barrier, vapour retarder, and rainscreen products and assemblies into continuous and integrated curtain wall envelope. Optimize curtain wall design to align envelope layers and to minimize thermal bridges.

.7 Prevent deflection and permanent or progressive glazing displacement. Restrict horizontal and vertical mullion deflection to less than L/175 (under uniformly distributed positive design wind load), and 10 mm maximum regardless of span.

.8 Design anchorage inserts for installation as part of other Sections of Work. Design anchorage assemblies to accommodate construction and installation tolerances.

.9 Provide all reinforcing within aluminum members as required by design and OBC to provide structurally sound assembly. In any case, mullion size shall not be increased due to provision of reinforcing.

.10 Design curtain wall and connections to substrate where the bottom of the curtain wall extends to a point below 1070 mm above finished floor level and separates a floor level from an adjacent interconnected space to withstand the required guard and handrail loads in accordance with the OBC and applicable local regulations. When requested by Consultant, provide a letter signed and sealed by a Professional Engineer certifying that the curtain wall conforms to the OBC requirements.

1.4 **SUBMITTALS**

.1 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Plans, sections, details, type of extrusions, profiles, finishes, panels, spandrels, operating components, doors, related flashings, closures, fillers, and end caps, and sealants.
  - .2 Products and glazing types.
  - .3 Anchorage inserts, system installation tolerances.
  - .4 Section and hardware reinforcement, anchorage, assembly fixings.
  - .5 Detailing, locations, and allowances for movement, expansion, contraction
  - .6 Path of cavity drainage and air pressure equalization.

.2 Samples:
- .1 Submit two samples of following in accordance with Section 01 10 10.
  - .1 250 mm long samples of each type of extrusion and finish.
  - .2 250 x 200 mm samples of insulating glass unit.
  - .3 One complete corner detail of door frame, glazing, and finish for each door type.
  - .4 Each door hardware item for Consultant's approval.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Reports:
- .1 Submit substantiating engineering data, and independent test results of pre-tested, curtain wall to substantiate compliance with the design criteria including air leakage and water penetration conforming to ASTM E283 and ASTM E331.
- .2 Submit documentation to substantiate ten years of experience in curtain wall manufacture and installation.

.5 Close-out submittals: Submit curtain wall data for incorporation into the Operations and Maintenance Manual as part of Section 01 10 10.

1.5 QUALITY ASSURANCE

.1 Retain a Professional Engineer, licensed in Province of Ontario, with experience in curtain wall of comparable complexity and scope to perform the following services as part of the Work of this Section:
- .1 Design of curtain wall.
- .2 Review, stamp, and sign shop drawings.
- .3 Conduct on-Site inspections and prepare and submit inspection reports.

.2 Shop mock-up:
- .1 Fabricate and erect one, full scale mock-up in shop of unitized curtainwall for shop testing, including air leakage, water penetration, and deflection in accordance with AAMA 501.
- .2 Demonstrate conformance to design data outlined herein.
- .3 Mock-up shall show full range of Products, finishes, textures, quality of fabrication, and workmanship including, but not limited to, framing members, glazing units, anchorage, opening units, doors and transitions to adjoining assemblies.

.3 Site mock-up:
- .1 Provide an in-situ site mock-up for testing of air and water infiltration to standards as outlined above to the satisfaction of an Independent Consultant.
- .2 Deliver and erect one, full scale mock-up minimum one bay in width and in height to include two vision panels and one spandrel panel, in location acceptable to Consultant.
- .3 Demonstrate installation procedures, finished look and quality of workmanship including, but not limited to, framing members, glazing units, anchorage, opening units, doors and transitions to adjoining assemblies.
- .4 Mock-up may form part of final Work, if acceptable to Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Handle curtain wall in accordance with AAMA CW-10.

.2 Protect aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Do not remove before final cleaning of building.

1.7 EXTENDED WARRANTY

.1 Submit a warranty for curtain wall in accordance with General Conditions, except that warranty period is extended to 2 years.
- .1 Warrant against failure to meet the design criteria and requirements such as interior leakage, insulating glass unit failure, finish degradation, frame condensation.
- .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **ACCEPTABLE MANUFACTURER(S) AND SYSTEM(S)**

.1 Curtain Wall: 'ThermaWall 2600 Series' by Alumicor Limited, '1600 U.T. Curtainwall' by Kawneer Company Canada Limited, or approved alternative.

.2 Aluminum doors: In accordance with Section 08 11 16.

2.2 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, sealants are to have low VOC content limits.

.2 Aluminum extrusions and channels: ASTM B221 and ANSI H35.1 AA6063 alloy, T6 temper.
.1 Profile and dimensions: Refer to Contract Drawings.
.2 Thermal breaks in frame members: Vertically aligned with glazing.

.3 Aluminum sheet: ASTM B209 and ANSI H35.1 AA1100 aluminum alloy, H14 temper, minimum 1.29 mm for sheets less than 610 mm wide and minimum 2.05 mm for sheets of a greater dimension.

.4 Reinforcements and anchors: ASTM A167, Type 304 to AISI No. 2B finish. Size as shown.

.5 Glass and glazing materials: As specified in Section 08 80 00.

.6 Spandrel panel airseal backpan: ASTM A653/A653M; 0.7 mm thick, Z275 galvanized steel sheet.

.7 Airseal and Aluminum Work sealant: ASTM C920, Type S, Grade NS, Class 100/50; One-part, low-modulus, moisture-curing, silicone. 'Dow Corning 790' by Dow Corning; 'Spectrem 1' by Tremco. Verify compatibility with insulating glass unit manufacturer's secondary sealant. Colour as selected by Consultant. Primer as recommended by manufacturer.

.8 Frame sealant: Type as recommended by the Aluminum Work manufacturer.

.9 Joint backing: Closed cell foam polyethylene rod, outsized minimum 30-50% larger than joint width and compatible with joint sealant. Product as recommended by sealant manufacturer.

.10 Airseal transition membrane: 'Sopraseal Stick 1100' by Soprema Inc., 'Exoair 110' by Tremco or 'Air-Shield' by W.R. Meadows. Membrane to come complete with applicable primer.

.11 Anchors, clips, and angles: Extruded aluminum or stainless steel.

.12 Shims and blocking for frame: Rigid plastic, wood is not permitted.

.13 Flashings, closures and trim: 1.0 mm minimum aluminum sheet, finish to match curtain wall extrusion finish.

.14 Screws, bolts and other fasteners: ASTM F738M; Stainless Steel Type 304.

.15 Isolation coating: CAN/CGSB-1.108-M; Bitumastic coating, acid and alkali resistant material.

.16 Spandrel panel insulation: CAN/ULC S702; Semi-rigid mineral fibre.
- .1 Type 703 by Owens-Corning.
- .2 CurtainRock by Roxul Inc.
- .3 Thickness: As required to fill void.
- .4 Insulation fasteners: Stik-Clip with retaining washer.

.17 Spray Foam Insulation: CFC free, polyurethane foam in place, closed cell low expansion, one component, minimum density 15 kg/m3.
- .1 'ENERFOAM' by Dow Chemical Canada.
- .2 'IPF All Weather Pro' by Rivenco Industries.

.18 Door hardware: Manufacturer's standard heavy duty hardware, based on the following:
- .1 Hinging device: extruded aluminum continuous gear hinge or 1 1/2 pair of heavy duty stainless steel butts complete with back up plates.
- .2 Closing device: LCN 4040 Series closers with back up plates.
- .3 Pull handles: Alumicor 1180, 25 mm diameter, anodized aluminum offset pull handles
- .4 Push bars (for doors without panic hardware): Alumicor 246, 25 mm diameter, anodized aluminum push bar.
- .5 Locking (basic locking): Adams Rite MS1850 Dead Lock with manufacturers standard cylinder on exterior and thumbturn on interior.
- .6 Locking (panic hardware): Von Duprin 33/35A rim panic or Von Duprin 3547 vertical rod panic.

.19 Weatherstripping: Durable, non-absorbing material resistant to deterioration by aging and weathering.

2.3 FABRICATION

.1 Fabricate sections true to detail, free from defects impairing appearance, strength and durability. Fabricate extrusions with sharp, well defined corners.

.2 Fabricate Aluminum Work in accordance with reviewed shop drawings and manufacturer's written instructions.

.3 Fabricate, fit, and secure framing joints and corners accurately, with flush surfaces, and hairline joints. Apply frame sealant at joints for weatherproof seams.

.4 Conceal anchors, reinforcement and attachments from view. Fabricate reinforcement in accordance with design requirements.

.5 Do not expose manufacturer's identification labels on aluminum assemblies.

.6 Fabricate continuous sill flashings with intermediate anchor clips, and joint reinforcing, form to profile shown. Fabricate filler and closure pieces as necessary for a complete and weather tight installation.

.7 Fabricate doors and frames complete with internal reinforcements, cut-outs, and recesses to accommodate finish hardware. Reinforce cut-outs to assure adequate strength.

.8 Fabricate Aluminum Work closures and trim from aluminum sheet. Form to profile shown. Make weathertight.

.9 Double weatherstrip windows and doors. Install weatherstripping in specially extruded ports and secure to prevent shrinkage or movement.

.10 Fabricate glazing recess with drainage to exterior.

2.4 **INFILL (SPANDREL) PANELS**

.1 Fabricate insulated panel inner facing of 0.9 mm aluminum sheet. Wrap edges with aluminum sheet, enabling installation and minor movement of perimeter seal.

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

.3 Place insulation within panel, adhered to exterior face of interior panel sheet over entire area of sheet with impale fasteners.

.4 Provide integral reinforcing and stiffeners as required to reinforce panel against deflection caused by wind and suction loads.

.5 Provide spacers as necessary to separate dissimilar metals.

.6 Ventilate and pressure equalize the air space outside the exterior surface of the insulation, to the exterior.

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

.8 Fabrication of spandrel panels:
- .1 Set spandrel back pans to framing, apply sealant to cover screw heads to maintain air tight seal between back pans and framing.
- .2 Adhere stick clips to metal back pans at 300 mm o.c. both ways. Apply insulation adhesive over entire surface of barrier and around clips held with adhesive.

.3 Install insulation to thicknesses indicated, cut insulation slightly over-size and press insulation boards firmly to barrier impaling them on clips without bending clips. Butt insulation boards tightly. Install retainers to clips.

.4 Glass: Consists of 6 mm heat strengthened spandrel glass in accordance with Section 08 80 00.

.5 Seal all joints in shop with high grade butyl sealant, including perimeter seal at backpan.

2.5 **JOINT BACKING AND ALUMINUM WORK SEALANT**

.1 Prepare substrate surface and mask as recommended by sealant manufacturer.

.2 Install joint backing and sealant at aluminum work and perimeter joints for weather tight installation in accordance with sealant manufacturer's instructions. Tool sealant. Remove excess sealant.

2.6 **FABRICATION TOLERANCES**

.1 Fabricate work to a tolerance of plus or minus 1.6 mm for vertical, horizontal, and diagonal dimensions of units under 2 m, and plus or minus 3.2 mm for dimensions greater than 2 m.

2.7 **FINISH**

.1 Extrusion finish: ‘Duranar (XL)’ by PPG in accordance with AAMA 2605. Colour: To be selected by Consultant.

.2 Panel and sheet finish: As indicated on drawings to match adjacent extrusion finish.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

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

.2 Install Work of this Section securely, in correct location, level, square, plumb, at proper elevations, free of warp or twist.

.3 Secure units by adjustable anchorage devices with allowance for accurate alignment. After alignment, positively lock anchorage devices to prevent movement except design expansion and contraction, seismic, and building sway. Anchors may not impose moments to structure. Conceal all fastenings from view.

.4 Site located fixings shall be subject to Consultant's review. Perform welding and drilling of steel and drilling of concrete as required to install fixings. Repair concrete chipped by drilling or fixing operations.

.5 Ensure devices for anchoring frame assemblies have sufficient adjustment to permit correct and accurate alignment. After alignment, positively secure anchorage devices to prevent movement other than those designed for expansion and contraction. Take into consideration climatic conditions prevailing at time of installation.

.6 Conceal securement devices unless otherwise specified. Should some exposed securement devices be necessary and it can be demonstrated accordingly to satisfaction of Consultant, exposed securement devices shall be same finish and colour of member in which they occur.

.7 Apply isolation coating at 0.8 mm dry film thickness to prevent corrosive or electrolytic action between dissimilar materials such as aluminum to concrete, masonry, galvanized steel and similar conditions.

.8 Install flashings, closures, and trim pieces.

.9 Fill voids between aluminum framing and adjacent construction with foam insulation.

.10 Refer to Contract Drawings for glazing type locations. Install glazing in accordance with Section 08 80 00.

.11 Automatic door operators to be supplied and installed by Section 08 70 00. Install doors and hardware to manufacturers' written instructions. Clean and adjust hardware for correct performance.

.12 Install aluminum door manufacturer's standard weatherstripping at door frame perimeter. Install weatherstripping throughout entire length and width of doors at jambs and heads.

.13 Install doors and hardware to manufacturers' written instructions. Clean and adjust hardware for correct performance.

.14 Adjust operable parts for correct function.

.15 Sealant: Prime and seal between frame members, sills, and thresholds and adjacent construction as a part of the work of this Section and in accordance with manufacturer’s written instructions.

.16 Remove damaged or unacceptable Products and assemblies from Site and replace to Consultant's acceptance.

.17 Install glass presence markers, in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

3.3 **ERECTION TOLERANCES**

.1 Tolerances: Non-cumulative.

.2 Vertical and horizontal positions: +/- 3 mm.

.3 Racking of face: 6 mm, nil in elevation.

3.4 **CLEANING**

.1 Maintain curtain wall, inside and outside, in clean condition throughout construction period.

.2 Remove labels, protective material, and glass presence markers from prefinished surfaces.

.3 Wash curtain wall with solution of mild detergent in warm water, with particular attention to recesses and corners. Wipe surfaces clean and dry.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, tool, equipment and services necessary for Window Wall work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels - Series: Components, Coatings and Finishes.

.2 AAMA CW-10, Care and Handling of Architectural Aluminum from Shop to Site.

.3 ANSI H35.1M, Alloy and Temper Designation Systems for Aluminum (Metric).

.4 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

.5 ASTM B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.6 ASTM B221M, Specification for Aluminum-Alloy Extruded Bars, Rods, Wires, Profiles and Tubes.

.7 ASTM C920, Specification for Elastomeric Joint Sealants.

.8 ASTM E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.9 ASTM E330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.10 ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

.11 ASTM E547, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.

.12 ASTM F738M, Specification for Stainless Steel Metric Bolts, Screws, and Studs.

.13 AAMA/WDMA/CSA 101/I.S.2/A440, Standard Specification for Windows, Doors, and Unit Skylights.

.14 CAN/CSA-A440-M/A440.1-M, Windows / User Selection Guide to CSA Standard CAN/CSA A440-M Windows.

.15 CAN/CGSB 1.108-M, Bituminous Solvent Type Paint.

.16 CAN/CGSB-82.1-M, Sliding Doors.

.17 CAN/ULC S702, Thermal Insulation, Mineral Fibre, for Buildings.

1.3 **DEFINITION(S)**

.1 Window Wall work: Shall mean aluminum window wall, operable windows, swing and sliding doors, slab edge covers, and framing mentioned in Part 2 of this Specification Section.

1.4 **DESIGN REQUIREMENTS**

.1 Design Window Wall work in accordance with following Climatic Design Data for Toronto contained in the Ontario Building Code:
- .1 Design temperature: January 1%, July 2 1/2%.
- .2 Hourly wind pressures: 1 in 50 year occurrence.

.2 Design Window Wall work to accommodate following without producing detrimental effect:
- .1 Cyclic 40°C daily thermal swing of components.
- .2 Cyclic, dynamic loading and release of loads such as wind loads.
- .3 13 mm vertical deflection in supporting structure and movement of supporting structure due to live, dead load, and creep or deflections, seismic load, sway displacement and similar items.

.3 Design to prevent accumulation of condensate on interior side of Window Wall framing under the following service conditions:
- .1 Interior temperature: 25°C.
- .2 Exterior temperature: -20°C.
- .3 Interior RH: 35%.

.4 Design windows in accordance to AAMA/WDMA/CSA -101/I.S.2/ A440 and CAN/CSA A440.2, to the following performance levels:
- .1 Performance class: AW
- .2 Minimum performance grade (PG): 40.
- .3 Minimum positive design pressure: 1920 Pa.
- .4 Minimum negative design pressure: - 1920 Pa.
- .5 Minimum water penetration test pressure: 330 Pa.
- .6 Minimum air infiltration/exfiltration: A3.
- .7 Condensation resistance: I57

.5 Restrict air infiltration/exfiltration, through Window Wall in accordance with ASTM E283 at pressure differential of 0.0003 $m^3/s\ m^2$ at differential of 300 Pa.

.6 Design and detail vented air space and controlled drainage path, in a rainscreen design, to actively discharge water and condensation, which enters into or forms within Window Wall, to exterior and prevent accumulation or storage of water within Window Wall. Prevent water from entering interior when tested in accordance with ASTM E331.

.7 Design balcony/terrace doors in accordance with the following:

.1 Air Infiltration: Outswing and Inswing Doors: When closed and locked, the test specimen shall be tested in accordance with ASTM E 283 entrance doors and frame shall not exceed 0.30 cfm/sq. ft. at a pressure differential of 6.24 psf (300 Pa).

.2 Water Resistance: Outswing Doors: When closed and locked, the test specimen shall be tested in accordance with ASTM E 331 and ASTM E 547 there shall be no uncontrolled leakage as defined in the test method at a static air pressure differential of 15 psf (718 Pa) (Single and Pairs of Outswing). Inswing Doors: When closed and locked, the test specimen shall be tested in accordance with ASTM E 331 and ASTM E547 there shall be no uncontrolled leakage as defined in the test method at a static air pressure differential of 12 psf (575 Pa) (Single and Pairs of Inswing).

.3 Uniform Design Load Test: When closed and locked, the test specimen shall be tested in accordance with ASTM E 330 at a minimum static air design pressure of 90 psf (4309 Pa) for single and 45/65 psf (2155/3112 Pa) for pairs applied in a positive and negative direction.

.4 Uniform Load Structural Test: When closed and locked, the test specimen shall be tested in accordance with ASTM E 330 at a minimum static air design pressure of 135 psf (6464 Pa) for single and 67.5/97.5 psf (3232/4668 Pa) for pairs (1.5 x design load) applied in a positive and negative direction.

.5 Thermal Transmittance Test (U-Factor): When tested in accordance with AAMA 1503, the conductive thermal transmittance (U-Factor) shall not be more than 0.49 BTU/hr/sf/F.

.6 Condensation Resistance Test (CRF): When tested in accordance with AAMA 1503, the condensation resistance factor (CRF) shall not be less than 55 frame, 75 glass.

.7 Condensation Index: When tested in accordance with CAN/CSA A440 the condensation index shall not be less than 44 frame; 61 glass.

.8 Design and detail air barrier, vapour retarder, and rainscreen products and assemblies into continuous and integrated Window Wall envelope. Optimize design to align envelope layers and to minimize thermal bridges.

.9 Prevent deflection and permanent or progressive glazing displacement. Restrict horizontal and vertical mullion deflection to less than L/175 (under uniformly distributed positive design wind load), and 10 mm maximum regardless of span.

.10 Design anchorage inserts for installation as part of other Sections of Work. Design anchorage assemblies to accommodate construction and installation tolerances.

.11 Design Window Wall and connections to substrate where the bottom of the Window Wall extends to a point below 1070 mm above finished floor level and separates a floor level from an adjacent interconnected space to withstand the required guard and handrail loads in accordance with the OBC and applicable local regulations. When requested by Consultant, provide a letter signed and sealed by a Professional Engineer certifying that the Window Wall conforms to the OBC requirements.

.12 Design Window Wall to incorporate 25 mm architectural louvres as indicated on drawings.

1.5 **SUBMITTALS**

.1 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Plans, sections, details, type of extrusions, profiles, finishes, panels, operating components, doors, related flashings, closures, fillers, and end caps, and sealants.
  - .2 Products and glazing types.
  - .3 Structural integrity of Window Wall, anchorage inserts, system installation tolerances.
  - .4 Section and hardware reinforcement, anchorage, assembly fixings.
  - .5 Detailing, locations, and allowances for movement, expansion, contraction
  - .6 Path of cavity drainage and air pressure equalization.

.2 Samples:
- .1 Submit two samples of following in accordance with Section 01 10 10.
  - .1 250 mm long samples of each type of extrusion and finish.
  - .2 One complete corner detail of door frame, glazing, and finish for each door type.
  - .3 250 x 200 mm sample of aluminum panel.
  - .4 Each door hardware item for Consultant's approval.
  - .5 200 x 200 mm sample of insect screen for operable windows for Consultant's approval of fibreglass mesh.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Reports:
- .1 Submit substantiating engineering data, and independent test results of pre-tested, Window Wall work to substantiate compliance with the design criteria including air leakage and water penetration conforming to CAN/CSA A440-M, ASTM E283 and ASTM E331.
- .2 Submit documentation to substantiate ten years of experience in aluminum window and door manufacture and installation.

.5 Close-out submittals: Submit window data for incorporation into the Operations and Maintenance Manual as part of Section 01 10 10.

1.6 QUALITY ASSURANCE

.1 Retain a Professional Engineer, licensed in Province of Ontario, with experience in Window Wall work of comparable complexity and scope to perform the following services as part of the Work of this Section:
- .1 Design of Window Wall work.
- .2 Review, stamp, and sign shop drawings and design calculations.
- .3 Conduct on-Site inspections and prepare and submit inspection reports.

.2 Shop mock-up:
- .1 Fabricate and erect one, full scale mock-up in shop of Window Wall for shop testing, including air leakage, water penetration, and deflection in accordance with CAN/CSA A440-M, ASTM E283 and ASTM E331.
- .2 Demonstrate conformance to specified design requirements.
- .3 Mock-up shall show full range of Products, finishes, textures, quality of fabrication, and workmanship including, but not limited to, framing members, glazing units, anchorage, slab edge covers, opening units, doors and transitions to adjoining assemblies and materials.

.3 Site mock-up:
- .1 Provide and erect one full scale in-situ mock-up for testing of air and water infiltration to standards as outlined above to the satisfaction of an Consultant.
- .2 Deliver and erect one, full scale mock-up of Window Wall assembly, in location acceptable to Consultant.
- .3 Demonstrate conformance to specified design requirements.
- .4 Demonstrate installation procedures, finished look and quality of workmanship including, but not limited to, framing members, glazing units, anchorage, slab edge covers, opening units, doors and transitions to adjoining assemblies and materials.
- .5 Mock-up may form part of final Work, if acceptable to Consultant. Remove and dispose of mock-ups which do not form part of Work.

.4 Quality Control: Inspection and testing of sealed joints shall be in accordance with testing and inspection method requirements to meet sealant quality specified by Consultant.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Handle aluminum work in accordance with AAMA CW-10.

.2 Protect aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Do not remove before final cleaning of building.

1.8 **EXTENDED WARRANTY**

.1 Submit a extended warranty for Window Wall work in accordance with General Conditions, except that warranty period is extended to 5 years.
- .1 Warrant against failure to meet the design criteria and requirements such as interior leakage, insulating glass unit failure, finish degradation, frame condensation.
- .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **ACCEPTABLE MANUFACTURER(S) AND SYSTEM(S)**

.1 Window Wall framing and operable windows: '4625 Series' by Toro Aluminum or approved alternative by Allan Window Technologies.

.2 Aluminum exterior doors: In accordance with Section 08 11 16 - Aluminum Doors, Frames, and Screens.

.3 Aluminum sliding doors: Doors shall conform to CAN/CGSB-82.1-M, CSA A440/A440.1 and as follows:
- .1 Thermally broken frame and insulated glazing units.
- .2 Locking Device: Latch-lock device, with locking function operable only from inside.
- .3 Door panels to be double operating.

.4 Balcony/terrace doors: Conforming to design requirements; ‘2000T Terrace Door’ by Kawneer or approved alternative by Allan Window Technologies or Toro Aluminum.

.5 Louvres: Pre-finished 25 mm thick aluminum louvre; ‘Standard Architectural Louvres’ by Toro Aluminum or approved alternative by Allan Window Technologies.

2.2 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, sealants are to have low VOC content limits.

.2 Aluminum extrusions and channels: ASTM B221 and ANSI H35.1 AA6063 alloy, T6 temper.
- .1 Profile and dimensions: Refer to Contract Drawings.
- .2 Thermal breaks in frame members: Vertically aligned with glazing.

.3 Aluminum sheet: ASTM B209 and ANSI H35.1 AA1100 aluminum alloy, H14 temper, minimum 1.29 mm for sheets less than 610 mm wide and minimum 2.05 mm for sheets of a greater dimension, unless otherwise specified or indicated.

.4 Reinforcements and anchors: ASTM A167, Type 304 to AISI No. 2B finish. Size as shown.

.5 Glass and glazing materials: As specified in Section 08 80 00.

.6 Spandrel panel airseal backpan: ASTM A653/A653M; 0.9 mm thick , Z275 galvanized steel sheet.

.7 Airseal and aluminum work sealant: ASTM C920, Type S, Grade NS, Class 100/50; One-part, low-modulus, moisture-curing, silicone. 'Dow Corning 790' by Dow Corning; 'Spectrem 1' by Tremco. Verify compatibility with insulating glass unit manufacturer's secondary sealant. Colour as selected by Consultant. Primer as recommended by manufacturer.

.8 Frame sealant: Type as recommended by the aluminum work manufacturer.

.9 Joint backing: Closed cell foam polyethylene rod, outsized minimum 30-50% larger than joint width and compatible with joint sealant. Product as recommended by sealant manufacturer.

.10 Airseal transition membrane: 'Exoair 110' by Tremco, 'Sopraseal Stick 1100' by Soprema Inc. or 'Air-Shield by W. R. Meadows. Membrane to come complete with applicable primer.

.11 Anchors, clips, and angles: Extruded aluminum or stainless steel.

.12 Shims and blocking for frame: Rigid plastic, wood is not permitted.

.13 Flashings, closures and trim: 1.0 mm minimum aluminum sheet, finish to match curtain wall extrusion finish.

.14 Screws, bolts and other fasteners: ASTM F738M; Stainless Steel Type 304.

.15 Isolation coating: CAN/CGSB-1.108-M; Bitumastic coating, acid and alkali resistant material.

.16 Spandrel panel insulation: CAN/ULC S702; Semi-rigid mineral fibre.
- .1 Type 703 by Owens-Corning.
- .2 CurtainRock by Roxul Inc.
- .3 Thickness: As indicated.
- .4 Insulation fasteners: Stik-Clip with retaining washer.

.17 Spray Foam Insulation: CFC free, polyurethane foam in place, closed cell low expansion, one component, minimum density 15 kg/m3.
- .1 'ENERFOAM' by Dow Chemical Canada.
- .2 'IPF All Weather Pro' by Rivenco Industries.

.18 Window hardware: Manufacturer's standard heavy duty hardware.

.19 Door hardware: Manufacturer's standard heavy duty hardware. Provide samples for the Consultant's approval. Hardware to be based on the following:

.1 Hinging device: extruded aluminum continuous gear hinge or 1 1/2 pair of heavy duty stainless steel butts complete with back up plates.

.2 Closing device: LCN 4040 Series closers with back up plates.

.3 Pull handles: 25 mm diameter, anodized aluminum offset pull handles

.4 Push bars (for doors without panic hardware): 25 mm diameter, anodized aluminum push bar.

.5 Locking (basic locking): Adams Rite MS1850 Dead Lock with manufacturers standard cylinder on exterior and thumbturn on interior.

.6 Locking (panic hardware): Von Duprin 33/35A rim panic or Von Duprin 3547 vertical rod panic.

.7 Hold open devices (where required): Glynn Johnson GJ104S for door stop only applications; Glynn Johnson GJ104H for applications that require both a stop and hold open.

.8 Sliding door hardware: As specified under Article 2.1.

.20 Insect screen (louvres): Extruded aluminum frames containing 14 x 18 heavy duty aluminum mesh in accordance with CAN/CSA A440. Screen to be retained in place with turn clip type fixings.

.21 Insect screen (windows): Extruded aluminum frames containing heavy duty, fine fibreglass mesh in accordance with CAN/CSA A440. Screen to be retained in place with turn clip type fixings. Provide samples for the Consultant's approval.

.22 Weatherstripping: Durable, non-absorbing material resistant to deterioration by aging and weathering.

2.3 FABRICATION

.1 Fabricate sections true to detail, free from defects impairing appearance, strength and durability. Fabricate extrusions with sharp, well defined corners.

.2 Fabricate window wall work in accordance with reviewed shop drawings and manufacturer's written instructions.

.3 Fabricate, fit, and secure framing joints and corners accurately, with flush surfaces, and hairline joints. Apply frame sealant at joints for weatherproof seams.

.4 Conceal anchors, reinforcement and attachments from view. Fabricate reinforcement in accordance with design requirements.

.5 Do not expose manufacturer's identification labels on aluminum assemblies.

.6 Fabricate continuous sill flashings with intermediate anchor clips, and joint reinforcing, form to profile shown. Fabricate filler and closure pieces as necessary for a complete and weather tight installation.

.7 Certify aluminum windows as complying with the AAMA/WDMA/CSA 101/I.S.2/A440 design criteria and requirements using an easily removable label located on the inside face of glazing.

.8 Position operable windows on main frame to provide direction of opening specified, free and smooth operation, without binding or sticking against main frame members.

.9 Fabricate doors and frames complete with internal reinforcements, cut-outs, and recesses to accommodate finish hardware. Reinforce cut-outs to assure adequate strength.

.10 Fabricate aluminum work closures and trim from aluminum sheet. Form to profile shown. Make weathertight.

.11 Double weatherstrip windows and doors. Install weatherstripping in specially extruded ports and secure to prevent shrinkage or movement.

.12 Fabricate glazing recess with drainage to exterior.

2.4 **ALUMINUM DOORS**

.1 Fabricate doors of welded construction.

.2 Glazing stop: Square, snap-on type, designed for neoprene glazing system.

.3 Equip doors with full weatherstripping at perimeter. Install weatherstripping throughout the full length and width of doors at jambs and heads.

2.5 **INFILL (SPANDREL) PANELS**

.1 Fabricate insulated spandrel panel inner facing of 0.9 mm aluminum sheet. Wrap edges with galvanized sheet, enabling installation and minor movement of perimeter seal.

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

.3 Place insulation within panel, adhered to exterior face of interior panel sheet over entire area of sheet with impale fasteners.

.4 Provide integral reinforcing and stiffeners as required to reinforce panel against deflection caused by wind and suction loads.

.5 Provide spacers as necessary to separate dissimilar metals.

.6 Ventilate and pressure equalize the air space outside the exterior surface of the insulation, to the exterior.

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

.8 Glass panels: Consists of 6 mm thick spandrel glass to the exterior with insulated backpan to the inside. Insulation thickness shall be as indicated, retained with stick clips. Seal all joints in shop with high grade butyl sealant, including perimeter seal at backpan. Colour of panels as indicated on Exterior Finish Legend.

.9 Metal panels: Consists of an exterior prefinished flush aluminum panel with panel stiffeners as required with 100 mm thick insulation core and galvanized sheet back-pan. Colour of panels as indicated on Exterior Finish Legend.

2.6 **FINISH**

.1 Extrusion finish: 'Duranar (XL)' by PPG in accordance with AAMA 2605. Colour: To be selected by Consultant.

.2 Metal Panel Finish: As indicated on Exterior Finish Legend.

.3 Doors: 'Duranar (XL)' by PPG in accordance with AAMA 2605. Colour: To be selected by Consultant.

.4 Panel and sheet finish: As indicated on drawings to match adjacent extrusion finish.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install aluminum work in accordance with reviewed shop drawings, manufacturer's written instructions, and AAMA/WDMA/CSA 101.

.2 Install Work of this Section securely, in correct location, level, square, plumb, at proper elevations, free of warp or twist.

.3 Apply isolation coating at 0.8 mm dry film thickness to prevent corrosive or electrolytic action between dissimilar materials such as aluminum to concrete, masonry, galvanized steel and similar conditions.

.4 Install flashings, closures, and trim pieces.

.5 Fill voids between aluminum framing and adjacent construction with foam insulation.

.6 Install sills in maximum lengths possible. For sills over 1200 mm in length, maintain 3 mm to 6 mm space at each end.

.7 Automatic door operators to be supplied and installed by Section 08 71 13. Install doors and hardware to manufacturers' written instructions. Clean and adjust hardware for correct performance.

.8 Refer to Contract Drawings for glazing type locations. Install glazing in accordance with Section 08 80 00.

.9 Spandrel panels:
- .1 Set spandrel back pans to framing, apply sealant to cover screw heads to maintain air tight seal between back pans and framing.
- .2 Adhere stick clips to metal back pans at 300 mm o.c. both ways. Apply insulation adhesive over entire surface of barrier and around clips held with adhesive.
- .3 Cut insulation slightly over-size and press insulation boards firmly to barrier impaling them on clips without bending clips. Butt insulation boards tightly. install retainers to clips.

.10 Install aluminum door manufacturer's standard weatherstripping at door frame perimeter. Install weatherstripping throughout entire length and width of doors at jambs and heads.

.11 Install doors and hardware to manufacturers' written instructions. Clean and adjust hardware for correct performance.

.12 Adjust operable parts for correct function.

.13 Remove damaged or unacceptable Products and assemblies from Site and replace to Consultant's acceptance.

.14 Install glass presence markers, in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

3.3 ERECTION TOLERANCES

.1 Tolerances: Non-cumulative.
- .1 Maximum variation from plumb: 1.5 mm/3 m non-cumulative or 12 mm/30 m, whichever is less.
- .2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.
- .3 Vertical and horizontal positions: +/- 3 mm.
- .4 Racking of face: 6 mm, nil in elevation.
- .5 Operable components: Consistent with smooth operation and weatherproof performance.
- .6 Maximum perimeter sealant joint between Window Wall work and adjacent construction: 13 mm.

3.4 **GLAZING PERIMETER AIRSEAL**

.1 Install glazing perimeter airseal at entire perimeter of each insulating glass unit to achieve an airseal from insulating glass unit to Window Wall frame. Do not obstruct path of cavity drainage and air pressure equalization.

.2 Prime and perform sealant work in accordance with manufacturer’s written requirements.

3.5 **AIRSEAL TRANSITION MEMBRANE**

.1 Install primer and airseal transition membrane in accordance with manufacturer's instructions. Install airseal transition membrane into extrusion reglet as indicated on drawings. If there is no extrusion reglet, mechanically fasten airseal transition membrane to frame with batten bar fastened at 150 mm o.c.

.2 Overlap airseal transition membrane 75 mm minimum and lap in direction of waterflow.

.3 Coordinate airseal transition to adjacent parts of Work.

3.6 **JOINT BACKING AND ALUMINUM WORK SEALANT**

.1 Prime and prepare substrate surface and mask as recommended by sealant manufacturer.

.2 Install joint backing and sealant at aluminum work and perimeter joints for weather tight installation in accordance with sealant manufacturer's instructions. Tool sealant. Remove excess sealant.

3.7 **CLEANING**

.1 Maintain Window Wall work, inside and outside, in clean condition throughout construction period.

.2 Remove labels, protective material, and glass presence markers from prefinished surfaces.

.3 Remove CAN/CSA-A440-M/A440.1-M certification labeling when directed by Consultant, in writing.

.4 Wash Window Wall work with solution of mild detergent in warm water, with particular attention to recesses and corners. Wipe surfaces clean and dry.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for finish hardware Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 BHMA, Builders Hardware Manufacturing Association.

1.3 **SUBMITTALS**

.1 Product data: Submit manufacturer's Product data in accordance with Section 01 10 10 indicating compliance with reference standards, transportation, storage, handling and installation requirements.

.2 Shop Drawings:
- .1 Submit Shop Drawings and 3 complete hardware lists in accordance with Section 01 10 10 indicating:
  - .1 Door locations, sizes, hardware manufacturer's catalogue numbers, finish symbols and quantities required.
  - .2 Locations and mounting heights of each type of hardware.
- .2 Supply templates and required information to door and frame manufacturer to enable accurate sizes, locations of cut-outs and reinforcement for hardware.
- .3 Submit templates to required trade to arrange for provisions for accurate setting and fitting of hardware.

.3 Samples:
- .1 Submit 2 samples in accordance with Section 01 10 10 of each item that is different from hardware specified and include manufacturer's parts lists and installation instructions.
- .2 Submit hardware component samples illustrating style, colour and finish. Tag samples identifying applicable Specification article number, brand name and number, finish, building location, date and catalogue number.
- .3 Do not order hardware until samples have been accepted. Submit new samples to replace rejected samples. Supply hardware and finishes identical to each accepted sample.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.5 Closeout submittals:
- .1 Submit the following in accordance with Section 01 10 10 for each Product for incorporation into Operation and Maintenance Manual:
  - .1 Maintenance data.
  - .2 Operating instructions and safety precautions.
  - .3 Parts list with name and address of supplier.
  - .4 Lubrication schedule and type of lubricant recommended.
  - .5 Keys, tools and special devices.
  - .6 Inspection procedures related to preventive maintenance.

1.4 QUALITY ASSURANCE

.1 General:
- .1 Manufacturers: Companies specializing in manufacturing door hardware and registered with BHMA.
- .2 Hardware supplier: Company specializing in supplying commercial door hardware and acceptable to manufacturer.

.2 Certifications:
- .1 Employ an Architectural Hardware Consultant to inspect completed installation and certify that hardware has been installed in accordance with manufacturer's printed instructions, Authorities having Jurisdiction and as specified.
- .2 Submit manufacturer's certificate that finish hardware and fire rated hardware meets specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Be responsible for packaging of hardware, on a set by set basis. As material is received from various manufacturers identify it to correspond to Hardware List symbols.

.2 Label packages legibly, indicating manufacturer's number, types, sizes, opening number and Hardware List reference number. Wrap hardware and include in package, screws, bolts and fastening necessary for correct installation. If hardware package is not complete, pay additional charges incurred by installer.

.3 Deliver hardware to Site packaged, labelled and cross-referenced to hardware list for each item and its scheduled installation location.

.4 Accept Products of this Section on Site and ensure that each item is undamaged.

.5 Catalogue and store hardware in secure area.

2 Products

2.1 **GENERAL**

.1 Aluminum door hardware: Supplied and installed under the Work of Section 08 11 16, 08 44 00 and 08 45 00.

.2 Carefully check and verify Hardware List against Contract Drawings to ensure that hardware listed can be used as specified. Inform Consultant of concerns regarding quality, quantity, operation or function of hardware selected:
- .1 Verify hand of doors, examine details on Contract Drawings and at Site to ensure hardware supplied can be correctly installed and is correct for Work as constructed.
- .2 Select hardware in accordance with applicable codes and regulations and to approval of local Fire Marshal.
- .3 Replace and pay for defective hardware including hardware which was incorrectly selected, and remedial and installation costs.

.3 Ensure that hardware selected will function correctly, meets Contract requirements and Ontario Building Code and authorities having jurisdiction.

.4 Ensure that each hardware item is of same type, design and by same manufacturer.

.5 Manufacturer's names or trade marks are not permitted on exposed surfaces of hardware.

.6 Include in packing slip a list of parts, name of supplier and door number in which lock is to be installed.

.7 Hardware for fire rated and labelled door and frame assemblies: ULC listed or as accepted by authorities having jurisdiction.

.8 Fire rated assemblies:
- .1 Hardware: Selected and installed in accordance with applicable codes and regulations, NFPA-80 and to approval of Ontario Fire Marshal.
- .2 Fire rated doors: ULC labelled hardware. Submit written certification of conformance to ULC requirements for each type of hardware prior to delivery.
- .3 Locksets and latchsets on fire rated doors: 19 mm throw minimum.

2.2 **ACCESSORIES**

.1 Items to be attached to masonry or concrete with expandable shields, lag screws, bolts or other fastening devices as required. Exposed screws: Stainless steel, Phillips or Robertson heads.

2.3 **FINISHES**

.1 Metal finishes: Free from defects, clean, unstained and of a uniform colour for each type of finish required. Exposed surfaces and anchors: Specified finish symbol of item.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install hardware in accordance with reviewed Shop Drawings, manufacturer's installation instructions, and applicable Codes and regulations.

.2 Install hardware in accordance with hardware templates.

.3 Adjust fixed and operable hardware for correct clearances and function.

.4 Mount hardware measured from finished floor to centre of hardware, unless indicated otherwise or required by Code:
- .1 Top hinge: 250 mm from head of door to top.
- .2 Bottom hinge: 265 mm from finished floor to bottom of hinge.
- .3 Intermediate hinge: Equal distance between top and bottom hinge.
- .4 Locksets, latchsets: 1000 mm.
- .5 Panic device crossbar: 1000 mm.
- .6 Push plates: 1100 mm to bottom of plates.
- .7 Guard bars: 1100 mm.
- .8 Door pulls: 1100 mm to bottom of pulls.
- .9 Blank strike: 1450 mm.
- .10 Blank fronts: 1450 mm.

3.3 **FIELD QUALITY CONTROL**

.1 Have hardware inspected after installation by hardware supplier's representative, obtain certification in writing that hardware has been supplied and installed in accordance with Specifications and hardware manufacturer's instructions and is functioning correctly.

3.4 **HARDWARE GROUPS/SCHEDULE**

.1 Hardware groups/schedule to follow.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, tool, equipment and services necessary for automatic door equipment work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 AAMA 611, Voluntary Standards for Anodized Architectural Aluminum.

.2 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels - Series: Components, Coatings and Finishes.

.3 ANSI/BHMA A156.19, Power Assist and Low-Energy Power-Operated Doors.

1.3 **DESIGN REQUIREMENTS**

.1 Design handicap door system comprising of low energy power operator with optional push and go door system as defined in ANSI/BHMA A156.19.

.2 Design system operator to activate if one push button from either side of door is pushed. Actuated door shall open slowly to back check (80°) in 3 to 6 seconds and to full open position in 4 to 7 seconds. Door shall remain open for period set to suit requirements (period of 5 to 30 seconds). After time delay door shall close by spring in door operator from 90° to 10° in 3 to 6 seconds from 10° to fully closed in 1-1/2 to 2 seconds.

.3 Design handicap door system to operate both doors, of a set of double doors, with the push of a single push button. Coordinate opening of doors so that one door is almost completely closed before the other door starts opening.

1.4 **SUBMITTALS**

.1 Product data: Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating performance criteria, compliance with appropriate reference standard(s), characteristics, limitations, trouble-shooting protocol, transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings in accordance with Section 01 10 10 indicating all connections, attachments, reinforcing, anchorage and location of exposed fastenings.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.

.1 Indicate cost, post consumer and pre-consumer recycled content for each product.

.2 Identify each regionally extracted and manufactured material, its source and cost.

.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.5 **EXTENDED WARRANTY**

.1 Submit a extended warranty for automatic door equipment in accordance with General Conditions, except that warranty period is extended to 2 years.

.1 Warrant against failure to meet design criteria and requirements.

.2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 **ACCEPTABLE MANUFACTURER(S) AND SYSTEM(S)**

.1 Heavy Duty Door Operator: Design is based on self contained, low pressure electro-hydraulic power. Operator to be as manufactured by one of the following:

.1 PowerSwing by Besam of Canada.

.2 Or approved alternatives by Dor-O-Matic or Horton Automatics.

.2 Integral IR sensor:

.1 Active infrared presence sensors, designed to control the opening, hold open, and closing cycles of sliding automatic doors, with fully adjustable detection pattern and sensitivity adjustments. Surface mounted to each side of swing door.

.2 Fabricate detectors which are capable of distinguishing false impulse events, including rain, snow, and which are unaffected by temperature changes, ambient light, or excessive traffic flow.

.3 As manufactured by Besam, Horton Automatics or Stanley Ltd.

.3 Door operating equipment shall be complete with electro mechanical motor gear box. Provide 3 position (off-on) switch. System shall operate between -30 deg C and 50 deg C.

2.2 **REQUIREMENTS**

.1 Functional Requirements:

.1 Equipment shall be designed to operate swing doors up to weight of 100 kg.

.2 Opening Speed:

.1 Door shall be field adjusted to back check as required in Table 1 of ANSI/BHMA A156.19.

.2 Opening speed to fully open shall be 4 seconds or longer.

.2 Hold Open: Door shall be field adjusted to remain fully open for not less then 5 seconds or more than 30 seconds.

.3 Closing Speed:
- .1 Doors shall be field adjusted to close 90° to 10° in 3 seconds or longer as required in Table 1 of ANSI/BHMA A156.19.
- .2 Doors shall close from 10° to fully closed in not less than 1.5 seconds.
- .3 Force required to prevent door from opening or closing shall not exceed 7 kg applied 25 mm from latch edge of door at any point in opening or closing cycle.
- .4 During power failure, doors shall open with manual pressure not exceeding 11.3 kg at point 25 mm from latch edge of door.
- .5 Doors shall be equipped with signs visible from either side, instructing user as to operation and function of door.

.4 Requirements:
- .1 Provide header complete with full housing.
- .2 Finishes:
  - .1 Base bid finish: To match curtain wall finish, 'Duranar (XL)' by PPG in accordance with AAMA 2605. Colour: To be selected by Consultant.
  - .2 Alternate finish: Clear anodized to AAMA 611 per Aluminum Association Designation System for Aluminum Finishes AAM12C22A41.
- .3 Dimensions and locations of automatic door operators to conform to requirements of the Ontario Building Code (OBC).
- .4 Operator shall be activated by 150 mm diameter stainless steel push button switches on either sides as indicated.
- .5 Switches shall bear universal handicap logo visible to all types of traffic.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install automatic door operators, controls and accessories for doors indicated in accordance with reviewed shop drawings and manufacturer written instructions.

.2 Installation of automatic door operators to be in accordance with requirements of the Ontario Building Code (OBC).

.3 Doors shall operate manually as though equipped with manual door closers, without damage to automatic door components, in event of power failure or in event of power termination.

.4 Co-ordinate this work with Section 08 11 13 and 08 11 16.

.5 Power supply to each door operator and wiring shall be provided by Division 26 - Electrical. Make connections at operators and at control panel and supply and install each electrical work between operators and activating controls. Comply with requirements of Division 26 - Electrical. All wiring shall be concealed and where exposed shall be run in conduit. Location of exposed wiring shall be subject to Consultant's approval.

3.3 **ADJUSTMENT AND CLEANING**

.1 Test and adjust operators and controls smooth and proper operation.

.2 Upon completion of Work of this Section, remove from Site all debris, equipment and excess material resulting from Work of this Section.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment, tools, and services necessary for glass and glazing Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM C920, Specification for Elastomeric Joint Sealants.

.2 ASTM D790, Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

.3 ASTM D2240, Test Method for Rubber Property - Durometer Hardness.

.4 CAN/CGSB-12.1-M, Tempered or Laminated Safety Glass.

.5 CAN/CGSB-12.3-M, Flat, Clear Float Glass.

.6 CAN/CGSB-12.8, Insulating Glass Units.

.7 CAN/CGSB-12.9-M, Glass, Spandrel.

.8 CAN/CGSB-12.20-M, Structural Design of Glass for Buildings.

.9 Glass Association of North America (GANA) Glazing Manual.

1.3 **DESIGN REQUIREMENTS**

.1 Glass Design:
- .1 Design glass using a probability of breakage of 8 lites per 1000 at the first application of design load.
- .2 Design glass to CAN/CGSB-12.20-M. Perform stress analysis. Design units to accommodate live, dead, lateral, wind, seismic, handling, transportation, and erection loads.
- .3 Perform a thermal stress analysis on each glass unit with Low-E coating and provide heat strengthening and/or tempered units as necessary to prevent thermal breakage.
- .4 Perform a thermal stress analysis on each insulating thermal unit and provide heat strengthening and/or tempered units as necessary to prevent thermal breakage.
- .5 Where required, design glazing units so as not to allow thermal stress fracture due to heat build-up behind insulating units.

.2 Limit glass deflection to flexural limit of glass with full recovery of glazing materials.

.3 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

.4 Design glazing in accordance with City of Toronto Green Development Standard - Bird Friendly Development Guidelines.

1.4 **SUBMITTALS**

.1 Shop drawings: Submit shop drawings in accordance with Section 01 10 10 for fabrication and erection of glazing elements indicating materials, thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.2 Samples:
- .1 Submit following samples in accordance with Section 01 10 10.
- .2 Submit one sample of each type of glass.
  - .1 300 x 300 mm of each type of insulating glass unit, complete with each different Low-E coating.
  - .2 300 x 300 mm of each colour of spandrel glass.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certificates: Submit manufacturer's certification that glass and glazing materials are compatible.

.4 IGMA Compliance Audit: Submit in accordance with Section 01 10 10, a written certification of successful completion of a Compliance Audit within the last six months.

1.5 **QUALITY ASSURANCE**

.1 Insulating glass unit fabricators shall be a certified member of the Insulating Glass Manufacturer’s Alliance (IGMA). IGMA members must participate in the certification program and shall have successfully passed a Compliance Audit within the last six months.

.2 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in the installation of glazing units of a similar size and nature.

1.6 **SITE CONDITIONS**

.1 Glaze with compounds, sealants, or tapes only when glazing surfaces are at temperatures over 4°C, and when positive that no moisture is accumulating on them from rain, mist, or condensation.

.2 When temperature of glazing surfaces is below 4°C, obtain from Consultant approval of glazing methods and protective measures which will be used during glazing operations.

1.7 **EXTENDED WARRANTY**

.1 In accordance with Section 08 44 00 and 08 45 00.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Glass manufacturers:
- .1 AGC Flat Glass.
- .2 Cardinal Glass Industries.
- .3 Guardian Industries.
- .4 PPG Industries Ltd.
- .5 Viracon Inc.

2.2 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, primers, coatings, sealers, sealants, adhesives and cleaners are to have low VOC content limits.

.2 Float glass: CAN/CGSB-12.3-M; clear, glazing quality, minimum 6 mm thick. Clear or tinted as indicated. Heat strengthened as required.

.3 Tempered glass: CAN/CGSB-12.1-M, Type 2, Class B, Category II, clear, minimum 6 mm thick.

.4 Spandrel glass: CAN/CGSB-12.9-M, 6 mm thick unless otherwise indicated, with water-based silicone emulsion coating applied to backside, ‘Opaci-Coat 300' by ICD High Performance Coatings or approved alternative. Colour: To the later selection of the Consultant.

.5 Ceramic frit glass: 6 mm thick unless otherwise indicated, glass with ceramic frit coating applied to backside. Ceramic frit: colour and glass surface as shown on Exterior Finish Legend. ‘Viraspan Opaque Frit' by Viracon or approved equal.

.6 Bird friendly plastic film: 50.8 micron thick single layer polyvinyl chloride, 'FFSG Feather Friendly Square' by 3M or approved alternative with exterior grade adhesive. Application pattern as indicated on drawings.

.7 Bird Friendly Ceramic frit glass: 6 mm thick unless otherwise indicated, glass with ceramic frit coating applied to backside. Ceramic frit: White dot 5 mm in diameter with density coverage of 100 mm on centre in square pattern in accordance with City of Toronto Green Development Standard - Bird-Friendly Development Guidelines. Provide on second surface, locations as shown on Exterior Finish Legend. 'Viraspan Opaque Frit' by Viracon or approved equal.

.8 Acid etched glass: CAN/CGSB-12.1-M, tempered glass with white acid etched surface as manufactured by Viracon or approved alternative. Thickness as indicated on drawings. Provide on second surface, location and pattern as shown on Exterior Finish Legend.

.9 Insulating glass units: To CAN/CGSB-12.8-M and IGMA requirements utilizing approved metallic stainless steel edge spacer. Dual seal with a PIB primary seal and silicone secondary seal.

.10 Argon gas: 100% pure. Argon gas to be used to fill air space at all insulated glass units.

.11 Low-E coating: High performance sputtered low-E coating. Provide insulating glass units with low-E coating edge deletion and low-E coating. Apply low-E coating to second surface. Sunguard - SuperNeutral (SN54) low-E coatings by Guardian Industries Corporation or approved alternative.

.12 Glazing and rebate primers, sealants, sealers, and cleaners: Compatible with each other. Type as recommended by glass manufacturer.

.13 Glazing sealant:
- .1 Airseal sealant: ASTM C920, Type S, Grade NS, Class 50; One part silicone, neutral cure sealant, medium modulus; '795 Silicone Building Sealant' by Dow Corning Corporation or 'Spectrum 2' by Tremco.
- .2 Aluminum work sealant: ASTM C920, Type S, Grade NS, Class 100/50; One part silicone, neutral cure sealant, ultre-low modulus; 790 Silicone Building Sealant' by Dow Corning Corporation or 'Spectrum 1' by Tremco.
- .3 Primer as recommended by manufacturer.
- .4 Verify compatibility with insulating glass unit manufacturer's secondary sealant.
- .5 Colour as later selected by Consultant.

.14 Heel & toe bead: Silicone sealant as recommended by glazing manufacturer.

.15 Glazing gasket: 'Visionstrip' by Tremco Ltd., extruded composite glazing seal, size as recommended by manufacturer.

.16 Glazing tape: 'Polyshim II' glazing tape EPDM shim.

.17 Glazing splines: Silicone, extruded shape to suit glazing channel retaining slot, colour as selected.

.18 Setting blocks (regular): EPDM, 80 - 90 Shore A durometer hardness to ASTM D2240, sized to suit glazing method, glass unit weight and area.

.19 Edge blocks: EPDM, 60-70 Shore A Durometer hardness, sized with 3 mm clearance from glass edge and spanning glass thickness(es). Capable of withstanding weight of glass unit, self adhesive on face.

.20 Glass presence markers: Easily removable, non-residue depositing.

.21 Screws, bolts and fasteners: Type 304 stainless steel.

2.3 **FABRICATION**

.1 Verify glazing dimensions on Site.

.2 Clearly label each glass lite with maker's name and glass type. Ensure labels are easily removable, non-residue depositing type. Do not remove labels until after Work is accepted by Consultant.

.3 Fabricate glazing not less than 3 mm smaller than rebate size in either dimension; allow for edge spacers, shims, and setting blocks as necessary.

.4 Work shall have smooth finished surfaces free from distortion and defects detrimental to appearance and performance.

.5 Carefully make and fit details. Take special care with exposed finished Work to produce a neat and correct appearance to the Consultant's acceptance.

.6 Fabricate argon filled thermal units with air space filled minimum 90% with argon gas.

.7 Provide bird warning glass in accordance with City of Toronto Green Development Standard - Bird Friendly Development Guidelines. Style as selected by Consultant.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Verify that openings for glazing are correctly sized and within tolerance.

.3 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.2 **PREPARATION**

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.3 **INSTALLATION**

.1 Provide glazing in accordance with IGMA recommendations. Provide continuous contact between glazing tapes and gasket to the glazing.

.2 Install glazing to the Work of Sections 05 52 00, 08 11 13, 08 11 16, 08 42 29, 08 42 33, 08 44 00 and 08 45 00.

.3 Provide neat, straight sight lines. Trim excess glazing material flush with top of stops and fixed leg of frames.

.4 Remove protective coatings, glazing stops, clean rebate and glass contact surfaces with solvent, wipe dry.

.5 Apply primer/sealer to contact surfaces, prior to glazing.

.6 Apply glazing tape as per manufacturer’s instructions including recommended corner sealant.

.7 Use setting blocks at 1/4 points and spacers to centre glass unit in frame.

.8 Install glazing in accordance with reviewed shop drawings and manufacturer's written instructions. Install glazing with full contact and adhesion at perimeter. Maintain edge clearance recommended by glass manufacturer.

.9 Apply a continuous heel bead of sealant around perimeter of inboard lite of the sealed unit and the metal framing.

.10 Re-install glazing stops ensuring continuous contact and rattle-free installation. Do not distort glass. Trim tape protruding more than 2 mm above stop.

.11 Install glazing gasket in accordance with manufacturer’s recommendations.

.12 Do not cut or abrade tempered, heat treated, or coated glass.

.13 Install glass presence markers in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

.14 Remove, dispose of, and replace broken, cut, abraded glass, and defective glass including but not limited to production dimples, 'tiger-stripping', chips, cracks, etc.

.15 Exterior glass: Glaze units with gasket on exterior side and glazing tape on interior side. Seal gap between glazing and stop with sealant to depth equal to bite of frame. Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

.16 Install bird warning glass in accordance with City of Toronto Green Development Standard - Bird-Friendly Development Guidelines.

3.4 **CLEANING**

.1 Immediately remove sealant and compound droppings from finished surfaces.

.2 Remove labels, protective material, and glass presence markers from prefinished surfaces.

.3 Clean glass surfaces with cleaning agents and methods in accordance with Manufacturer's written instructions.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment, tools and services necessary for interior glass and glazing Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM D2240, Test Method for Rubber Property - Durometer Hardness.

.2 CAN/CGSB-1.108-M, Bituminous Solvent Type Paint.

.3 CAN/CGSB-12.1-M, Tempered or Laminated Safety Glass.

.4 CAN/CGSB-12.11-M, Wired Safety Glass.

.5 Glass Association of North America (GANA) Glazing Manual.

.6 NFPA 80, Standard for Fire Doors and Other Opening Protectives.

.7 ULC CAN4 S104-M, Standard Method for Fire Tests of Door Assemblies.

.8 ULC CAN4 S106-M, Standard Method for Fire Tests of Window and Glass Block Assemblies.

1.3 **DESIGN REQUIREMENTS**

.1 Design units to accommodate live, dead, lateral, wind, seismic, handling, transportation, and erection loads.

.2 Limit glass deflection to flexural limit of glass with full recovery of glazing materials.

1.4 **SUBMITTALS**

.1 Shop drawings: Submit shop drawings in accordance with Section 01 10 10 for fabrication and erection of glazing elements indicating materials, thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.2 Samples: Submit one sample of each type of glass in accordance with Section 01 10 10.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
   .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
   .2 Identify each regionally extracted and manufactured material, its source and cost.

.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.5 **QUALITY ASSURANCE**

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in the installation of glazing units of a similar size and nature.

.2 Fire Protective Rated Glass: Each lite shall bear permanent, nonremovable label of ULC certifying it for use in tested and rated fire protective assemblies.

1.6 **SITE CONDITIONS**

.1 Glaze with compounds, sealants, or tapes only when glazing surfaces are at temperatures over 4°C, and when positive that no moisture is accumulating on them from rain, mist, or condensation.

.2 When temperature of glazing surfaces is below 4°C, obtain from Consultant approval of glazing methods and protective measures which will be used during glazing operations.

1.7 **EXTENDED WARRANTY**

.1 Provide a 5 year warranty, commencing from date of Substantial Performance, against defects in interior glazing work and warrant them to be free from:
- .1 Cracked or scratched glass, shrinking, cracking, staining, hardening, sagging of glazing materials; loosening or rattling of glass; All will be considered defective work.
- .2 Warranty to include the removal of defective Products, replacement with new Products conforming to the specifications, and restoration of work damaged by removal and replacement including labour and installation costs.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Glass manufacturers:
- .1 AGC Flat Glass.
- .2 Guardian Industries.
- .3 PPG Industries Ltd.
- .4 Viracon Inc.

2.2 MATERIALS

.1 All materials under Work of this Section, including but not limited to, primers, coatings, sealers, sealants, adhesives and cleaners are to have low VOC content limits.

.2 Tempered glass: CAN/CGSB-12.1-M, Type 2, Class B, Category II, clear, minimum 12 mm thick for doors and screens, unless otherwise indicated.

.3 Wired glass: CAN/CGSB 12.11-M, Type 1, Style 3; 6 mm thick or as otherwise noted on Door Schedule, clear polished glass.

.4 Fire rated glass: 20 min. to 3 hr. fire rating tested to ULC CAN4 S104-M and ULC CAN4 S106-M, 8 mm thick or as otherwise noted on Door Schedule with appropriate labelling stating fire rating and approval, clear polished glass. Firelite Plus by Nippon Electric Glass Company Ltd. or approved alternative.

.5 Glazing and rebate primers, sealants, sealers, and cleaners: Compatible with each other. Type as recommended by glass manufacturer.

.6 Pivot doors (suite showers): ‘200 Series Patch Fittings’ by Inkan Limited or approved alternative by C.R. Laurence or approved alternative.

.7 Glazing tape: ‘Polyshim II’ glazing tape EPDM shim.

.8 Glazing tape (fire rated glass): Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.

.9 Glazing splines: EPDM or neoprene, extruded shape to suit glazing channel retaining slot, colour as selected.

.10 Setting blocks (regular): EPDM, 80 - 90 Shore A durometer hardness to ASTM D2240, 100 mm long x 6 mm high x rebate width minimum, size designed for glass size and weight of glass unit.

.11 Edge blocks: EPDM, 60-70 Shore A Durometer hardness, sized with 3 mm clearance from glass edge and spanning glass thickness(es). Capable of withstanding weight of glass unit, self adhesive on face.

.12 Glass presence markers: Easily removable, non-residue depositing.

.13 Isolation coating: CAN/CGSB 1.108-M; Bitumastic paint.

.14 Screws, bolts and fasteners: Type 304 stainless steel.

2.3 **FABRICATION**

.1 Verify glazing dimensions on Site.

.2 Clearly label each glass lite with maker's name and glass type. Ensure labels are easily removable, non-residue depositing type. Do not remove labels until after Work is accepted by Consultant.

.3 Fabricate glazing not less than 3 mm smaller than rebate size in either dimension; allow for edge spacers, shims, and setting blocks as necessary.

.4 Work shall have smooth finished surfaces free from distortion and defects detrimental to appearance and performance.

.5 Carefully make and fit details. Take special care with exposed finished Work to produce a neat and correct appearance to the Consultant's acceptance.

3 Execution

3.1 **EXAMINATION**

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.2 **PREPARATION**

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.3 **INSTALLATION**

.1 Provide glazing in accordance with IGMA recommendations. Provide continuous contact between glazing tapes and gasket to the glazing.

.2 Install glazing to the Work of Sections 08 11 13, 08 11 16 and 08 45 00.

.3 Provide neat, straight sight lines. Trim excess glazing material flush with top of stops and fixed leg of frames.

.4 Remove protective coatings, glazing stops, clean rebate and glass contact surfaces with solvent, wipe dry.

.5 Apply primer/sealer to contact surfaces, prior to glazing.

.6 Apply glazing tape as per manufacturer's instructions including recommended corner sealant.

.7 Use setting blocks at 1/4 points and spacers to centre glass unit in frame.

.8 Install glazing in accordance with reviewed shop drawings and manufacturer's written instructions. Install glazing with full contact and adhesion at perimeter. Maintain edge clearance recommended by glass manufacturer.

.9 Apply a continuous heel bead of sealant around perimeter of inboard lite of the sealed unit and the metal framing.

.10 Re-install glazing stops ensuring continuous contact and rattle-free installation. Do not distort glass. Trim tape protruding more than 2 mm above stop.

.11 Install glazing gasket in accordance with manufacturer's recommendations.

.12 Do not cut or abrade tempered, heat treated, or coated glass.

.13 Install glass presence markers in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

.14 Remove, dispose of, and replace broken, cut, abraded glass, and defective glass including but not limited to production dimples, 'tiger-stripping', chips, cracks, etc.

.15 Interior glass: Glaze interior glass using glazing gasket glazing tape.

.16 Wire glass: Install wired glass in fire rated metal doors with 5 mm gap between glazing stops, in accordance with ULC and NFPA 80 requirements. Strike and point exposed joints between metal and glass.

.17 Glass shower doors: Adjust doors for smooth and balanced door movement.

.18 Fire rated glass:
- .1 Place setting blocks located at quarter points of glass with edge block no more than 150 mm from corners.
- .2 Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.
- .3 Glaze vertically into labelled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.
- .4 Place glazing tape on free perimeter of glazing in same manner described above.
- .5 Install removable stop and secure without displacement of tape.
- .6 Install so that appropriate ULC markings remain permanently visible.

3.4 **CLEANING**

.1 Immediately remove sealant and compound droppings from finished surfaces.

.2 Remove labels, protective material, and glass presence markers from prefinished surfaces.

.3 Clean glass surfaces with cleaning agents and methods in accordance with Manufacturer's written instructions.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for louvres Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 American Architectural Manufacturers Association (AAMA) Aluminum Association Designation System for Aluminum Finishes.

.2 AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels - Series: Components, Coatings and Finishes.

.3 ASTM B209M Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.4 ASTM B211M Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire.

.5 ASTM C920, Specification for Elastomeric Joint Sealants.

.6 CAN/CGSB-1.108-M, Bituminous Solvent Type Paint.

1.3 **DESIGN REQUIREMENTS**

.1 Design louvre Work in accordance with OBC and to withstand live, dead, lateral. wind, seismic, handling, transportation and erection loads.

.2 Aerodynamic performance: 50% free area minimum.

.3 Limit deflection of louver members to not more than 1/180 of span between supports when subjected to wind load of 1 Kpa applied horizontally to louvre face.

.4 Design louvers to accommodate expansion and contraction of components due to temperature changes.

.5 Design louvers to allow for additional side jamb reinforcing where long, uninterrupted openings occur.

1.4 **SUBMITTALS**

.1 Shop drawings: Submit shop drawings in accordance with Section 01 10 10 indicating fabrication and erection details, including anchorage, accessories, thicknesses, profiles, finishes, pressure drop, face area, and free area.

.2 Samples: Submit duplicate 600 x 600 mm samples of louvres in accordance with Section 01 10 10 indicating frame and reinforcing, bird screens finished in selected colours.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certification: Submit certified data from independent laboratory substantiating aerodynamic performance.

.5 Close-out submittals: Submit operation and maintenance data for incorporation into Operations and Maintenance Manual in accordance with Section 01 10 10.

2 Products

2.1 **MANUFACTURED UNITS**

.1 Fixed aluminum louvre:
- .1 Acceptable products and manufacturers: Storm resistant louvre, 'RS Series' by C/S Group or approved alternative by MW McGill Ltd.
- .2 Aluminum sheet: ASTM B209M.
- .3 Depth: 200 mm.
- .4 Frame and mullion: ASTM B211M; Extruded aluminum alloy Aluminum Association alloy 6063-T5 assembled with fastenings. 2.06 mm thickness minimum for head, sill, jamb and mullions.
- .5 Blade: Stormproof with centre watershed in blade, 1.52 mm thick minimum; maximum blade length: 1500 mm.
- .6 Finish: 'Duranar (XL)' by PPG in accordance with AAMA 2605. Colour: As indicated on Exterior Finish Legend.

2.2 **ACCESSORIES**

.1 All materials under Work of this Section, including but not limited to, sealants are to have low VOC content limits.

.2 Isolation coating: CAN/CGSB-1.108-M; Bituminous solvent type paint.

.3 Bird screen: Crimped 2.90 mm diameter aluminum wire cloth secured to 3 mm minimum thick extruded aluminum U frame mitred at corners. Mesh size: 13 mm at air exhaust, 19 mm at air intake.

.4 Anchors and fasteners: AISI Type 304 stainless steel.

.5 Sealant: ASTM C920, Type M, Grade NS, Class 25; Two-part, Polyurethane non-sag type. Dymeric by Tremco Ltd., Sikaflex 2C-NS by Sika Inc., colour as selected by Consultant. Primer and joint backing as recommended by sealant manufacturer.

3 Execution

3.1 **INSTALLATION**

.1 Coordinate framing and anchorage for louvres with other parts of the Work.

.2 Install bird screen to inside face of louvres.

.3 Install louvres in accordance with manufacturer's instructions and accepted shop drawings. Securely anchor into opening.

.4 Apply isolation coating to separate dissimilar metals, and metals and masonry or concrete unless neoprene washers are shown.

.5 Seal louvre perimeter with sealant and joint backing for weather tight seal in accordance with requirements of Section 07 92 00.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for gypsum board Work.

1.2 **REFERENCES**

.1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

.2 ASTM C475, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.3 ASTM C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

.4 ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

.5 ASTM C645, Specification for Nonstructural Steel Framing Members.

.6 ASTM C754, Specification for Steel Framing Members to Receive Screw-Attached Gypsum Board.

.7 ASTM C840, Specification for Application and Finishing of Gypsum Board.

.8 ASTM C1002, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.9 ASTM C1278, Specification for Fiber-Reinforced Gypsum Panel.

.10 ASTM C1396, Specification for Gypsum Board.

.11 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

.12 CGSB 19-GP-21M, Sealing and Bedding Compound, Acoustical.

.13 CSA A123.3-M Asphalt or Tar Saturated Roofing Felt.

.14 CAN/ULC-S702, Mineral Fibre Thermal Insulation for Buildings.

1.3 **DESIGN REQUIREMENTS**

.1 Design ceiling suspension system in accordance with manufacturer's printed directions and ASTM C754.

.2 Design ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

.3 Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.

.4 Design suspension system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation/relocation of light fixtures.

.5 Design subframing as necessary to accommodate, and to circumvent, conflicts and interferences where ducts or other equipment prevent the regular spacing of hangers.

.6 Design steel stud framing system for wall assemblies with a height greater than 3000 mm and those assemblies incorporating non-standard gypsum board assemblies including, but not limited to, abuse resistant gypsum board and cement board.

1.4 REGULATORY REQUIREMENTS

1. Provide fire separations and fire protection exactly as specified in test design specification that validates the specified rating. Verify that work specified in other Sections, as a part of the entire assembly, meets applicable validating test design specification.

1.5 SUBMITTALS

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop Drawings: Submit Shop Drawings in accordance with Section 01 10 10 indicating:
- .1 Adjacent construction, elevations, sections and details, dimensions, thickness, finishes and relationship to adjacent construction.
- .2 Submit STC rating performance data and fire rating performance data of all insulation materials in accordance with partition types and related insulation thicknesses as indicated on drawings.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.

.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certifications: Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

1.6 **QUALITY ASSURANCE**

.1 Qualifications: Execute the Work of this Section by skilled, qualified, and experienced workers trained in the installation of the Work of this Section.

.2 Retain a Professional Engineer, licensed in Province of Ontario, with experience in Work of comparable complexity and scope, to perform following services as part of Work of this Section:
- .1 Design of wall systems with height greater than 3000 mm and at non-standard gypsum board assemblies including, but not limited to, assemblies incorporating abuse resistant gypsum board and cement board.
- .2 Design of suspended gypsum board assemblies.
- .3 Review, stamp, and sign Shop Drawings and design calculations.
- .4 Conduct shop and on-site inspections, prepare and submit written inspection reports verifying that this part of Work is in accordance with Contract Documents and reviewed Shop Drawings.

1.7 **SITE CONDITIONS**

.1 Do not begin Work of this Section until:
- .1 Mechanical and electrical Work above the ceiling is complete.
- .2 Substrate and ambient temperature is above 15°C.
- .3 Relative humidity is below 80 %.
- .4 Ventilation is adequate to remove excess moisture.

.2 Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 24 h before, during, and 24 h after installation.

2 Products

2.1 **MATERIALS**

.1 General:
- .1 All materials under Work of this Section, including but not limited to, sealants, adhesives, and primers are to have low VOC content limits.
- .2 Wherever possible, gypsum board, steel studs, ceilings and framing used in work of this Section are to contain recycled content.

.2 Steel framing: ASTM C754; ASTM A653/A653-M, Z275; cold rolled, galvanized steel sheet.
- .1 Bailey Metal Products Limited
- .2 Corus Metal Profiles

.3 Steel studs and track runners: ASTM C645; Galvanized steel studs and runners, 32 mm wide x depth as indicated on Contract Drawings. Formed from galvanized steel sheet, thicknesses as follows:
- .1 Less than 3000 mm: Minimum 0.53 mm (25 ga.).
- .2 Greater than 3000 mm and non-standard assemblies: Minimum 0.91 mm (20 ga.), unless otherwise required to accommodate intended condition.

.4 Main carrying channels: ASTM C645; Formed from galvanized steel sheet, 38 x 19 mm cold rolled, channels.

.5 Resilient channel: ASTM C645; 0.5 mm thick galvanized metal, 57 mm wide x 12 mm deep for walls and ceiling to reduce sound transmission.

.6 Furring channels: ASTM C645; Formed from galvanized steel sheet, 22 mm winged flange type, cold rolled.

.7 Furring channels (hat type): ASTM C645; 0.5 mm base steel thickness, galvanized. 70 mm wide x 22 mm deep hat shaped channel.

.8 Heavy duty furring channels: ASTM C645; 0.9 mm steel thickness, galvanized hat shaped channel with a wider and deeper size as required by manufacturers.

.9 Hanger wires: 4.1 mm minimum diameter galvanized pencil rod.

.10 Tie wire: 1.6 mm thick minimum diameter, soft annealed, galvanized steel wire.

.11 Corner bead, casing bead, and special shapes: Formed from 0.6 mm thick minimum, galvanized steel sheet, designed to be concealed by joint compound.

.12 Control joint strip: Roll formed from galvanized steel sheet, with a tape protected recess, 6 mm wide x 11 mm deep.

.13 Screw fasteners: ASTM C1002 Type S; Corrosion resistant.

.14 Concrete anchors: tie wire sleeve anchors, ‘Redi-Drive Anchors' by ITW Red Head or approved alternative.

.15 Acoustic/fire-rated semi-rigid insulation: Conforms to ASTM C423 and ASTM E84; semi-rigid mineral wool, unfaced, friction fit. Thickness: As indicated on drawings.
- .1 'Thermafiber SAFB' by Thermafiber Incorporated (as supplied by CertainTeed Corporation Canada).
- .2 'Roxul AFB' by Roxul Incorporated.

.16 Acoustic Batt Insulation: CAN/ULC-S702; Type 1; spun inorganic glass fibres, unfaced, friction fit. Thickness: As indicated on drawings.
- .1 ‘NoiseReducer' acoustic batts by CertainTeed Corporation Canada.
- .2 'QuietZone' acoustics batts by Owens Corning Canada.

.17 Semi-Rigid Acoustic Insulation: ASTM C612, Type 1A, semi-rigid inorganic fibres (either mineral or glass) with a thermosetting resin binder, either unfaced or ASJ-faced, pin-clip installation, minimum density 64 kg/m3. Thickness and facing: As indicated on drawings.
- .1 'Thermafiber Versaboard 40' by Thermafiber Incorporated (as supplied by CertainTeed Corporation Canada).
- .2 'Fiberglas 704' by Owens Corning Canada.

.18 Semi-Rigid Acoustic Insulation: ASTM C612, Type 1A, semi-rigid inorganic glass fibres with a thermosetting resin binder, either unfaced or reinforced white facing, pin-clip installation, minimum density 64 kg/m3. Thickness and facing: As indicated on drawings.
- .1 'Thermafiber Versaboard 40' by Thermafiber Incorporated (as supplied by CertainTeed Corporation Canada).
- .2 'Insul-SHIELD' by Johns Manville.
- .3 Or approved alternative that exhibits the same or better performance as either of the above preferred materials.

.19 Rigid Insulation: CAN/ULC-S701, Type 3; extruded polystyrene rigid board, square edges (for metal securement channels). Thickness: As indicated on drawings.
- .1 'STYROSPAN' by Dow Chemical Company Canada.
- .2 'FOAMULAR 250' by Owens Corning Canada.

.20 Thermal Batt Insulation: Spun inorganic glass fibre batts, unfaced, friction fit. Thickness: As indicated on drawings.
- .1 'High-Performance' batts by CertainTeed Corporation Canada.
- .2 'JM THERMAL' batts by Johns Manville.

.21 Metal securement channel: ‘Cel-Lok’ by Owens Corning or approved alternative by Dow Chemical Company Canada. Fasteners to be Tapcon anchors.

.22 Acoustical sealant: CGSB 19-GP-21M; Single component, non-skinning synthetic rubber sealant. Acoustical Sealant by Tremco.

.23 Sound/Vibration isolation hangers and clips:
- .1 Type 1 (isolation hangers): Unit shall consist of a steel spring in series with a neoprene isolating element. ‘Model W30N’ by Mason Industries Inc., or approved alternative. Provide hangers to ensure that working load does not exceed 2/3 of solid load. Design hangers to tolerate 30 deg. misalignment.
- .2 Type 2 (Isolation clips): Natural organic rubber compound molded to isolate ferrule from galvanized steel clip, maximum design load of 16 Kg per clip.‘RSIC-1 Sound Isolation Clip’ by PAC International, inc. or approved alternative. Noted clips to be used in conjunction with furring and z-channels at ceiling location as indicated.

.24 Insulation clips, adhesive and tape:
- .1 Insulation clips: Stic-Klip by Eckel Industries of Canada Ltd., with self locking type washers or equivalent by Continental Steel Stud.
- .2 Clip adhesive: High strength, resilient PVC adhesive having drying time of 0 to 30 minutes (rapid initial set) and 24 hours final set, compatible with insulation adhesive, insulation air barrier and substrate, non-corrosive to galvanized steel, 311 N minimum holding strength at 3 day cure.
- .3 Pressure sensitive tape: Pressure sensitive tape having adhesive compatible with facing surface and fabricated from a material that matches the performance criteria and surface of the facing material. Type as recommended by facing manufacturer.

.25 Gypsum board: ASTM C1396; gypsum board 12.7 mm thick of maximum practical lengths to minimize end joints, unless indicated otherwise. Furnish Board by Certainteed Gypsum Canada, CGC Inc., or G-P Products.

.26 Fire rated gypsum board: ASTM C1396; gypsum board 15.9 mm thick of maximum practical lengths to minimize end joints, unless indicated otherwise. Furnish Type X Board by Certainteed Gypsum Canada, CGC Inc., or G-P Products.

.27 Fire rated gypsum board: ASTM C1396; gypsum board 15.9 mm thick of gypsum mineral core in maximum practical lengths to minimize end joints, unless indicated otherwise. Type C by Certainteed Gypsum Canada, Firecode C Board by CGC Inc. or approved alternative by G-P Products.

.28 Abuse Resistant Panels: ASTM C1396; 12.7 mm thick unless indicated otherwise on drawings; ‘Abuse Resistant’ by Certainteed Gypsum Canada, ‘Sheetrock AR’ by CGC Inc. or ‘ToughRock’ by G-P Products.

.29 Interior Cementitious Board: High strength portland cement building panel with self adhesive glass tape; provide board with heavier mesh reinforcement for suspended applications. ‘PermaBase’ by Certainteed Gypsum Canada, Durock by CGC Inc., or approved alternative G-P Products.

.30 Moisture resistant board: 12.7 mm thick of maximum practical lengths to minimize end joints, unless indicated otherwise; ‘ProRoc Extra Abuse Type X with M2Tech’ by Certainteed Gypsum Canada, ‘Aquatough’ by CGC Inc. or ‘DensArmor Plus’ by G-P Products.

.31 Tile Backer: Water resistant tile backer board meeting ASTM C1278, thickness as indicated. ‘GlasRoc Tile Backer’ by Certainteed Gypsum Canada, ‘Fibrerock Interior Aquatough Panel’ by CGC Inc. or ‘Dens Shield’ by G-P Products.

.32 Foil faced gypsum board: gypsum board with kraft-backed aluminum foil laminated to one side. Sheetrock, foil back by CGC or approved alternative by G-P Products.

.33 Shaftwall gypsum system:
1. Steel J-Runner: ASTM C645; Rolled formed sheet steel, 25 gauge, by CGC, Gypsum Corporation or approved alternative.

2. C-H stud: hot-dipped galvanized by CGC, Gypsum Corporation or approved alternative.
3. Liner Panel: ASTM C1396; Gypsum wallboard panel, Thickness: 25.4 mm, Width: 610 mm. 'M2Tech Shaftliner Type X' by Certainteed Gypsum Canada, or approved alternative by CGC or Gypsum Corporation.
4. Face Panel: ASTM C1396; Gypsum wallboard panel, 1 layer, Thickness: 15.9 mm, Width: 1219 mm. 'GlasRoc Shaftliner Type X' by Certainteed Gypsum Canada, or approved alternative by CGC or Gypsum Corporation

34. Building paper: No. 15 perforated asphalt felt to CSA A123.3, as manufactured by IKO or approved alternative.

35. Primer: Where indicated by board manufacturer, provide primer as required to achieve finishes as defined in ASTM C840.

36. Latex Fortified Mortar: Of type recommended by cementitious board manufacturer to suit application.

.37 Joint reinforcing tape:
- .1 Standard gypsum board: ASTM C475; 50 mm wide x 0.25 mm thick, perforated paper, with chamfered edges.
- .2 Moisture resistant and tile backer boards: ASTM C475; fibreglass mat joint tape as recommended by board manufacturer to suit location.
- .3 Cement Board: Mesh reinforcing tape recommended by cement board manufacturer.

.38 Foil tape: 75 mm wide aluminum foil tape.

.39 Bonding adhesive: Type for purpose intended and as recommended and approved by manufacturer.

.40 Joint and patching compound: ASTM C475; Asbestos-free, supplied by manufacturer of gypsum board used.

.41 Fast setting patching compound: ASTM C475; Asbestos-free, Sheetrock or Durabond by CGC Inc., ProRoc products by Certainteed Gypsum Canada or approved alternative.

.42 Access doors: Supplied by other Sections for installation as part of the Work of this Section.

.43 Foam gasket: Continuous closed cell neoprene foam gasket; type as recommended by gypsum board manufacturer for intended application.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **SUSPENSION FRAMING**

.1 Install ceiling systems in accordance with reviewed Shop Drawings and manufacturer's written instructions.

.2 Install hanger wires plumb and securely anchored to the building structural framing, independent of walls, pipes, ducts, and metal deck; install additional framing and hangers to bridge interference items.

.3 Install sound/vibration isolation hangers at all suspended ceilings where indicated in strict accordance with manufacturer's printed instructions. Install sound/vibration clips at low-profile ceilings where indicated in strict accordance with manufacturer’s printed instructions.

.4 Install hanger wires at 1200 mm maximum centres along carrying channels, not less than 25 mm, and not more than 150 mm from channel ends.

.5 Install additional hangers at lighting fixture and ductwork locations. Do not attach hanger wires to mechanical or electrical equipment. Do not support mechanical and electrical fixtures and fitting on ceiling without the ceiling manufacturer's written acceptance.

.6 Install main carrying channels transverse to structural framing members. Lap main carrying channels 200 mm minimum at splices and wire each end with two loops and prevent clustering or lining-up of splices.

.7 Install furring channels at 400 mm o.c., not less than 25 mm, and not more than 150 mm from perimeter walls, at openings, at interruptions in ceiling continuity, and at change in plane. Install furring channels to a tolerance of 3 mm maximum in 3600 mm.

.8 Install additional main carrying and furring channels to frame and to reinforce openings such as recessed lighting fixtures, access hatches, ceiling grilles, outlet boxes, ventilating outlets and similar items.

3.3 **STEEL STUDS AND FURRING**

.1 Install steel studs and furring in accordance with reviewed Shop Drawings and manufacturer's written instructions.

.2 Install steel stud partitions to underside of structure unless indicated otherwise.

.3 Install track runners at floors, ceilings, and underside of structure; align track runners accurately and secure to structure at 600 mm centres maximum.

.4 Install double top track runner assembly to prevent the transmission of structural loads to steel studs.

.5 Install steel studs vertically at 400 mm o.c., unless otherwise indicated, and not more than 50 mm from abutting walls, at openings, and at each side of corners. Install studs securely to track runners.

.6 Schedule and coordinate steel framing installation with mechanical and electrical services installation.

.7 Install full height, double studs at door and service openings, fastened together and stiffened back to the structure to prevent vibration when doors close.

.8 Provide double studs boxed together at all openings, sill, head and jambs and at door jambs, fastened together and stiffened back to the structure to prevent vibration. At each opening exceeding 900 mm in width, double studs shall be 20 ga. extending to structure above, and adequately anchored at each end. Provide steel studs above and below openings spaced at 400 mm oc maximum. All metal stud partitions above doors and screens over 1220 mm wide shall be secured to structure over and reinforced with sway bracing to stabilize walls to prevent lateral movement.

.9 Erect three studs at corner and intermediate intersections of partitions. Space 50 mm apart and brace together with wired 19 mm channels.

.10 Stiffen partitions over 2440 mm high or 3000 mm long, or both, with horizontal bracing extended for full length of partitions. Provide one line of bracing in partitions. Space lines to provide equal unbraced panels. Provide bracing for portions of partitions over door openings in partitions over 3000 mm high, and bracing both above and below openings in partitions located no greater than 150 mm from top and bottom of opening, and extending two stud spaces beyond each edge of opening for both doors and windows. Wire tie or weld bracing to studs.

.11 Frame control joints using back to back double studs at abutting structural elements, at dissimilar backup interface, at dissimilar walls and ceilings, at structural expansion and control joints, at door and other openings, and at 9000 mm maximum spacing in continuous runs. Install control joint strips and secure in place.

.12 Install additional support framing at openings and cutouts for built-in equipment, upper cabinet support, access panels and similar items.

.13 Attach to framing adequate steel reinforcing members or an 18 ga. steel stud mounted horizontally and notched around furring members to support the load of, and to withstand the withdrawal and shear forces imposed by, items installed upon the work of this Section. Such items include, but are not restricted to, coat hooks, washroom accessories, handrail anchors, rub rails, grab bars, guards, wall-hung cabinets and fitments, shelving, curtain and drape tracks; Owner supplied equipment; and minor mechanical and electrical work. Heavy mechanical and electrical equipment shall be self-supporting in Divisions 21, 22, 23 and 26.

.14 Provide for support and incorporation of flush-mounted and recessed mechanical and electrical equipment and fixtures only after consultation and verification of methods with those performing the work of Divisions 21, 22, 23 and 26.

.15 Install cross bracing in accordance with the steel stud manufacturer's recommendations.

3.4 **BUILDING PAPER**

.1 Apply 2 layers of sheathing paper over the wall framing. Apply the sheathing paper vertically over studs and lap joints not less than 100 mm. Attach the sheathing paper to the framing with roofing nails or staples, spaced not more than 75 mm o.c. along the edges of the outer later of sheathing paper.

3.5 **FIRE RATED ASSEMBLIES**

.1 Install Products in fire rated assemblies in strict accordance with applicable ULC tested and approved designs.

.2 Stiffen fire rated walls over 3.66 m high, where linear length of wall is greater than 2.44 m between perpendicular wall supports, with diagonal bracing above the ceiling extending perpendicular to wall at a 45° angle to structure above. Locate diagonal bracing at maximum 2.44 m o.c.

.3 Where double layers of gypsum board are shown, and required for fire rating, screw first layer to studs and furring and laminate the second layer to the first using joint filler as an adhesive. Stagger joints between first and second layers.

3.6 **ACOUSTICAL INSULATION**

.1 Acoustic batt insulation: Install acoustic insulation in partitions, between steel studs, and as indicated on Contract Drawings and in accordance with the manufacturer's instructions. Fill stud cavities to full height of partitions and carefully cut and fit acoustic insulation around services and protrusions.

.2 Mechanical Fastening (Stic-Klip):
.1 Install insulation by adhesive clip method in accordance with manufacturer's specifications.

.2 Locate clips 100 mm from edges of panels where they abut other materials and at joints between panels otherwise, spaced throughout at 300 mm to 450 mm centres each way.

.3 At clip locations clean supporting surfaces and apply 50 mm square film of adhesive; coat clips with adhesive and press firmly to wall, holding in place until adhesive exudes through clip base perforations; remove excess adhesive to permit curing; impale insulation panels on clips and secure.

.4 Apply compatible pressure sensitive tape over butt joints of all insulation having an integral facing.

3.7 **ACOUSTICAL SEALANT**

.1 Install acoustical sealant to acoustically insulated partitions in accordance with the manufacturer's instructions and Contract Drawings.

.2 Install acoustical sealant under floor runner track, at partition perimeter both sides and at openings, cut-outs, and penetrations, concealed from view in the final installation.

3.8 **RIGID INSULATION (MECHANICAL ATTACHMENT)**

.1 Install metal securement channel in accordance with reviewed shop drawings and manufacturer’s written instructions.

.2 Install metal securement channel in corners of walls and ceilings and at changes in direction of substrate.

3.9 **GYPSUM BOARD**

.1 Comply with ASTM C840. Install gypsum board in accordance with reviewed Shop Drawings and manufacturer's written instructions.

.2 Install gypsum board vertically or horizontally, whichever results in fewer end joints. Locate end joints over supporting members.

.3 Install gypsum board in lightly butted contact at edges and ends and with 1.6 mm maximum open space between boards; do not force gypsum board into place. Do not install imperfect, damaged or damp boards.

.4 Install gypsum board butting paired tapered edge joints, and mill-cut or field-cut end joints; do not place tapered edges against cut edges or ends.

.5 Install vertical joints minimum 300 mm from the jamb lines of openings and stagger vertical joints over different studs on opposite sides of partitions.

.6 Do not locate joints within 200 mm of corners or openings, except where control joints occur at jamb lines or where openings occur adjacent to corners. Where necessary, place a single vertical joint over the centre of wide openings.

.7 Install gypsum board laminated to concrete and concrete masonry surfaces with adhesive. Apply adhesive with a notched trowel over entire surface of gypsum board being laminated in accordance with manufacturer's written instructions. Install laminated gypsum board in locations indicated on drawings.

.8 Cut, drill and patch gypsum board as may be necessary to accommodate the Work of other trades.

9. Fire Separations:
   1. Construct gypsum board assemblies, where located, in accordance with tested assemblies to obtain required or indicated fire rated assemblies. As a minimum fire separations shall consist of metal framing covered on both sides by fire-rated gypsum board.
   2. Install assemblies tightly to enclosing constructions to maintain integrity of the separations. Install casing beads at all perimeter edges.

.10 Foil faced gypsum: Install foil faced gypsum board with the foil side on the cold side of the building. Apply compatible foil tape over all joints of gypsum board to ensure continuity of vapour retarder is maintained.

3.10 **CEMENT BOARD**

.1 Apply cementitious board to framing, with screw fasteners and taped joints in accordance with manufacturers instructions.

.2 Pre-cut board to required sizes and make necessary cutouts. Fit ends and edges closely but not forced together.

.3 Fasten board to steel framing with rust proof self-drilling, self-threading case hardened screws at 200 mm oc for walls and 150 mm oc for suspended applications.

.4 Apply mesh tape centred over all joints and corners but not overlapped.

.5 Apply 3 mm minimum thick skim coat of latex fortified mortar uniformly over entire cementitious board surfaces. Leave surface smooth and flat to receive subsequent finish.

3.11 **SHAFTWALL LINER**

.1 Plan and lay out metal framing components to ensure that all wall sections are plumb and properly aligned.

.2 Install J-track along the ceiling line and vertically at columns and abutting partitions, positioning the long legs closest to the shaft, using powder actuated fasteners or other approved method. Secure each piece with the appropriate fasteners spaced a maximum 610 mm O.C.

.3 Attach J-track to the floor with fasteners spaced at 610 mm O.C.

.4 Install Shaftliner panels vertically. The leading edge of the first panel must be attached to the long leg of the vertical J-track with 41 mm Type S screws spaced 610 mm O.C. Secure the top and bottom edges using the same fasteners and spacing.

.5 Friction-fit C-H stud into the top and bottom tracks and slide it snugly against the Shaftliner panel. Make sure the edge of the board is in full contact with the centre web of the stud and covered by all the tabs.

.6 Place the next Shaftliner panel between the tabs and flange on the opposite side of the C-H stud and secure it to the top and bottom track with 41 mm Type S screws spaced 610 mm O.C.

.7 Install subsequent Shaftliner panels and C-H studs in the same manner. Check periodically to ensure they are plumb.

.8 At the end of a partition run, cut the last Shaftliner panel slightly narrower and shorter than the opening to facilitate installation.

.9 For walls exceeding 3.7 m in height, Shaftliner panel end joints shall fall alternately in the upper and lower 1/3 of the partition. Use a C-H stud placed horizontally between panels to secure each joint.

.10 Frame all cut openings in the shaft side with J-track, providing adequate structural support for openings over 1219 mm.

.11 Anchor elevator door frames to shaftwall enclosures; however, they must remain independently supported by the building frame.

3.12 **CORNER, CASING BEADS AND TRIM**

.1 Corner reinforcing bead: Install along all external angles, erect plumb, level and with a minimum of joints. Secure with screws at 225 mm o.c. apply filler over flanges flush with nose of the bead and extending at least 75 mm onto surface of board each side of corner. When filler dries, apply a thin coat of topping cement and blend onto adjoining surfaces.

.2 Casing bead: Install where wallboard butts against a surface having no trim concealing the juncture and where shown on drawings. Erect casing beads plumb or level, with minimum joints, and secure with screws at 300 mm o.c. apply filler over flange flush with bead and extending at least 75 mm onto surface of board. When dry, apply a thin coat of topping cement and blend onto adjoining surfaces.

.3 Recess channels and trim: Install recess channels and special metal trim where shown. Secure to substrate. Provide casing beads full height on wallboard edges at recess channels and metal trim.

3.13 **CONTROL JOINTS**

.1 Construct control joints with roll formed steel sections set in gypsum board facing and supported independently on both sides of joint. Install to manufacturer's printed instructions.

.2 Locate control joints where indicated such as but not limited to the the following locations, in alignment with control joints in concrete and masonry walls; at abutting structural elements; at dissimilar walls and ceilings; at wall juncture with suspended ceilings and soffits; at changes in substrate construction.

3.14 **JOINT TAPING AND FINISHING**

.1 Install reinforcing tape and a minimum of 3 coats of joint compound over gypsum board joints, metal trim and accessories, and screw fasteners in accordance with the gypsum board manufacturer's instructions.

.2 Fill gaps between ,and any imperfections in, gypsum boards with joint compound, allow to dry, and sand smooth ready for painting.

.3 Install finished gypsum board Work smooth, seamless, plumb, true, flush, and with square, plumb, and neat corners.

.4 Finish gypsum board in accordance with ASTM C840 to the following grades:
1. Level 0: No taping, finishing, or accessories required. Use above suspended ceilings and within other concealed spaces, unless the assembly is fire rated, sound rated, sound or smoke controlled, or unless the space serves as an air plenum.
2. Level 1: At joints and interior angles embed tape in joint compound. Leave surface free of excess joint compound. Tool marks and ridges are acceptable. Use above suspended ceilings and within other concealed spaces if the gypsum board assembly is fire rated, sound rated, sound or smoke controlled, or the space serves as an air plenum.
3. Level 2: At joints and interior angles embed tape in joint compound with one separate coat of joint compound applied over joints, angles, fastener heads, and accessories. Use for water resistant gypsum board indicated for use as a substrate for ceramic tile.
4. Level 3: At joints and interior angles embed tape in joint compound with two separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply joint compound smooth and free of tool marks and ridges. Use where heavy grade wall coverings are the final decoration.
5. Level 4: At joints and interior angles embed tape in joint compound with three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply joint compound smooth and free of tool marks and ridges. Use for all locations except those indicated for other finish levels.

6. Level 5: At joints and interior angles embed tape in joint compound with three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply a thin skim coat of joint compound, or a material manufactured especially for this purpose, to the entire surface. Leave surface smooth and free of tool marks and ridges. Use where semi-gloss or gloss finish coatings are the final decoration.

3.15 ACCESS DOORS

.1 Install access doors supplied as part of other parts of the Work.

3.16 SITE TOLERANCES

.1 Install metal support systems to ensure that, within a tolerance of +3 mm and -1.5 mm for plaster thickness, finish surfaces will be flat within 3 mm under a 3 m straightedge, and with no variation greater than 1.5 mm in any running 300 mm, and that surface planes shall be within 3 mm of dimensioned location.

3.17 REPAIR

1. Make good cut-outs for services and other work, fill in defective joints, holes and other depressions with joint compound.

2. Make good defective work, and ensure that surfaces are smooth, evenly textured and within specified tolerances to receive finish treatments.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for tile Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ANSI A108/A118/A136.1, Installation of Ceramic Tile.

.2 ANSI A137.1, Specifications for Ceramic Tile.

.3 ASTM C144, Specification for Aggregate for Masonry Mortar.

.4 CAN/CSA A3000, Cementitious Materials Compendium.

.5 CAN/CGSB 25.20, Surface Sealer for Floors .

.6 TTMAC Specification Guide 09300 Tile Installation Manual.

.7 TTMAC, Maintenance Guide.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations and warranties.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Tile layout, patterns, and colour arrangement.
  - .2 Perimeter conditions, junctions with dissimilar materials.
  - .3 Setting details.

.3 Samples:
- .1 Submit following sample panels in accordance with Section 01 10 10.
  - .1 Each colour, texture, size, and pattern of tile.
  - .2 Adhere tile samples to 400 x 400 x 12.5 mm thick cement board complete with selected grout colour in joints.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.

.2 Identify each regionally extracted and manufactured material, its source and cost.

.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.5 Certificates: Submit manufacturer's certificates stating that materials supplied are in accordance with this specification.

.6 Closeout submittals: Submit recommended maintenance instructions and listing of recommended maintenance Products for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10 .

1.4 QUALITY ASSURANCE

.1 Perform Work of this Section by a company that is a member in good standing of the Terrazzo Tile and Marble Association of Canada with proven, acceptable experience on installations of similar complexity and scope.

.2 Pool/shower area system:

.1 All work related to the pool/shower area system is to be carried out by a single Contractor who is to be responsible for the complete installation of the system from the concrete surface to the completed finished installation.

.2 This work is not to be divided to multiple contractors.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in adequate crates or containers with manufacturer’s name and product description clearly marked.

.2 Handle and store tiles in a manner to avoid chipping, breakage or the instruction of foreign matter. Take precautions to protect the mortar and grout admixtures from freezing or from excessive heat.

1.6 SITE CONDITIONS

.1 Do not install Work of this Section outside of the following environmental ranges without the Consultant's and Product manufacturer's written acceptance:

.1 Ambient air and surface temperature: 15^0C to 45^0C.

.2 Precipitation: None.

.2 Install temporary protection and facilities to maintain the Product manufacturer's, and specified, environmental requirements for 7 Days before, during, and 7 Days after installation.

1.7 **MAINTENANCE**

.1 Submit extra tile amounting to 3% of gross area covered, allowing proportionately for each pattern and type specified and which are part of the same Production run as installed Products. Store maintenance Products as directed by the Consultant.

1.8 **EXTENDED WARRANTY**

.1 Submit a extended written warranty for pool/shower area system in accordance with the General Conditions, except that warranty period is extended to 10 years.
- .1 Warrant Work against water leakage and failure to perform.
- .2 Coverage: Complete replacement including effected adjacent Work.

2 Products

2.1 **MATERIALS**

.1 General: All materials under Work of this Section, including but not limited to, sealants, adhesives, and sealers are to have low VOC content limits.

.2 Tile:
- .1 To ANSI A137.1.
- .2 Supply coves, caps, inside and outside corners and bullnose tile as required.
- .3 Where unfinished tile edge is exposed, supply cap to Consultant's selection.
- .4 Tiles types to be selected by Consultant.

.3 Tile Base: Cove base tile to match floor tile.

.4 Thresholds: Match floor tile, full width of door openings, at junction of ceramic tile and carpet and resilient floor materials.

.5 Divider Strip: Stainless steel edge, continuous at all exposed tile edges, depth as required to suit tile thickness. 'Schiene-E' by Schluter Systems or approved alternative.

2.2 **ACCESSORIES**

.1 Cement: CAN/CSA A3000, Type GU.

.2 Sand: ASTM C144.

.3 Water: Potable and free of minerals and other contaminants which are detrimental to mortar and grout mixes.

.4 Polymer additive: Keralastic by Mapei Inc or approved alternative by Flextile Ltd. or Laticrete International.

.5 Pre-mixed thin-set mortar: ANSI A108/A118/A136.1:
- .1 'Kerabond with Keralastic Latex Additive' by Mapei Inc. unless otherwise recommended by grout manufacturer to suit tile size or application.
- .2 Or approved alternative by Latricrete International.

.6 Pool/shower area system: Provide the following system for use at pools and shower areas as manufactured by Laticrete:
- .1 Adhesive: Polymer fortified, thin-set mortar complete with antimicrobials. '254' by Laticrete.
- .2 Mortar bed: Factory mixed blend of portland cement and aggregates with latex admixture '226 thick bed mortar with 3701 admixture' by Laticrete or approved alternative.
- .3 Waterproofing: Single component, self curing liquid rubber polymer. 'Hydro Ban' by Laticrete.
- .4 Finish: To be selected by Consultant.
- .5 Epoxy grout: High performance sanded epoxy grout 'SpectraLOCK Pro Grout' by Laticrete in colour as selected by Consultant.

.7 Fibrepoxy System: Consisting of three coatings.
- .1 Primer: Epoxy primer for adhesion to underlying masonry surface
- .2 High build epoxy coat: Coating with milled fibreglass and property materials integrated into the application.
- .3 Finish coat: Coating of epoxy paint to seal underlying epoxy/fibreglass matrix.
- .4 Markings around drains will be applied with epoxy material to comply with Code requirements within the pool shell.

.8 Primer: To meet specified requirements of adhesive manufacturer.

.9 Cleaner: In accordance with TTMAC's requirements and as recommended by tile manufacturer.

.10 Crack-isolation system: Crack Isolation System consisting of liquid rubber membrane and fibre reinforcing fabric tape. 'Mapelastic' by Mapei Inc., or 'Blue 92' by Laticrete International Inc.

.11 Waterproof Membrane: Waterproof Membrane System made from black, coldapplied, self-curing, liquid rubber polymer and an integral reinforcing fabric.'Mapelastic 315' by Mapei or '9235 Waterproofing' by Laticrete International Inc.

.12 Grout:
- .1 Floors and bases (5 mm to 10 mm joint width): 'Ultra/Color' by Mapei Inc. or approved alternative by Laticrete International.
- .2 Floors and walls (3 mm to 16 mm joint width): Polymer-modified sanded portland cement grout; 'Keracolor S' by Mapei Inc. or approved alternative by Flextile Ltd. or Laticrete International.
- .3 Walls (1.5 mm to 3 mm joint width): 'Ker 800' by Mapei Inc. or approved alternative by Laticrete International.

.4 Walls (over 3 mm joint width): 'Ultra/Colour Plus' by Mapei Inc. or approved alternative by Laticrete International.
.5 Colours: As selected by the Consultant.

.13 Sealer: CAN/CGSB-25.20, penetrating, type as recommended by tile manufacturer.

.14 Joint backing: Round, closed cell, foam rod, oversized by 30% to 50%, Shore A hardness of 20, tensile strength 140 to 200 kPa.

.15 Tile sealant: In accordance with Section 07 92 00.

2.3 **MIXES**

.1 Levelling bed mix:
.1 1 part Portland cement.
.2 4 parts sand.
.3 1 part water (including polymer additive), adjusted for water content of sand.
.4 1/10 part polymer additive.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **SURFACE PREPARATION**

.1 Clean and dry surfaces thoroughly. Remove oil, wax, grease, dust, dirt, paint, tar, primers, form release agents, curing compound, and other foreign material from substrate surfaces which may prevent or reduce adhesion.

.2 Neutralize any trace of strong acids or alkali from the substrate.

3.3 **CONTROL JOINTS**

.1 Continue control, construction, and cold joints in the structural substrate up through the tile finish, and align with mortar joints where possible. Review joint locations on Site with the Consultant.

.2 Install joint widths to match grout joint widths, except where a minimum width is indicated.

.3 Install control joints in the following typical locations:
.1 Aligned over changes in type of substrate.
.2 At the restraining perimeters such as walls and columns.

.3 Interior areas (not subject to sunlight): 6 mm minimum width, at 7320 mm o.c. maximum.
.4 Interior areas (subject to sunlight): 6 mm minimum width, at 3660 mm o.c maximum.
.5 As indicated on the Contract Drawings.

.4 Seal control joints in accordance with Section 07 92 00.

3.4 **LEVELLING BED**

.1 Install a levelling bed on uneven substrate surfaces, level and plumb substrates in accordance with the following tolerances:
.1 Vertical surfaces: 3 mm in 2.4 m maximum .
.2 Horizontal surfaces: 6 mm in 3 m from finished levels of the surface, or better.

.2 Clean structural substrate control joints and blow-clean with compressed air. Grout fill control joints flush to slab with levelling bed.

3.5 **POOL/SHOWER AREA SYSTEM**

.1 Install ‘226' and ‘3701' by Laticrete mortar bed over ‘254' by Laticrete thin set adhesive on uneven substrate surfaces, level and plumb substrates in accordance with manufacturer’s written instructions and having the following tolerances:
.1 Vertical surfaces: 3 mm in 2.4 m maximum.
.2 Horizontal surfaces: 6 mm in 3 m from finished levels of the surface, or better.

.2 Provide slopes to drains as indicated on drawings.

.3 Apply ‘Hydro Ban’ by Laticrete waterproofing with a spray applicator on prepared substrate to a total dry film thickness of 0.8 mm in accordance with manufacturer’s printed directions. Carry up walls to 50 mm high.

.4 Install finish materials after site inspection by manufacturer, ensuring that materials have been installed correctly and in accordance with manufacturers written instructions. Provide written inspection report verifying manufacturers warranty of system.

.5 Apply ‘SpectraLOCK Pro’ by Laticrete grout for pool/shower area system in accordance with epoxy grout manufacturer's directions to produce watertight, filled joints without voids, cracks and excess grout. Thoroughly compact and tool grout. Finish grout flush to edge thickness of tile and remove excess grout with soft burlap or sponge moistened with clean water.

.6 Ensure surfaces are entirely cured as recommended by Manufacturer.

.7 Install fibrepoxy system in accordance with manufacturers written instructions.

3.6 **CRACK ISOLATION**

.1 Apply crack-isolation system over shrinkage and non-structural hairline cracks and "spiderwebbing" cracks in structural concrete floor slabs or in concrete topping on structural concrete floor slabs.

.2 Apply liberal coat of membrane with brush or roller over cracks, slightly wider than width of reinforcing tape. Roll out enough fabric to cover crack; cut and imbed while liquid is wet. After laying fabric, firmly brush or roll a top coat of liquid over tape.

3.7 **WATERPROOFING MEMBRANE**

.1 Apply with a trowel on prepared substrate to a total dry film thickness of 1.143 mm in accordance with manufacturer’s printed directions. Carry up walls to 50 mm high.

3.8 **GENERAL INSTALLATION REQUIREMENTS**

.1 Install tiles in accordance with manufacturer's instructions and TTMAC Specification Guide 09300 Tile Installation Manual. Manufacturer's installation instructions govern over TTMAC Installation Manual.

.2 Lay out Work to produce a symmetrical pattern with minimum amount of cutting. Ensure cut tile at room perimeter and at joints is not less than ½ full size.

.3 Install trim to be placed under tile in locations indicated on Drawings.

.4 Set tiles in place and rap or beat with a beating block as necessary to ensure a proper bond and to level surface. Align tile for uniform joints and allow to set until firm. Clean excess mortar from surface of tile with a wet cloth or sponge while mortar is fresh.

.5 Adjust joints between units uniform, plumb, straight, even, and true, with adjacent tile flush. Align grout joints in both directions unless indicated otherwise.

.6 Align floor, base and wall grout joints.

.7 Install tile accessory fittings for a complete and fully coordinated tile assembly.

.8 Install wall tile full height unless indicated otherwise.

.9 Cut and fit tile neatly around piping, fittings, joints, projections and around recesses items e.g. washroom accessories. Where surface mounted equipment and accessories are installed on tile surfaces, extend tile over surfaces. Cut edges smooth, even, and free from chipping; chipped and broken edges are not acceptable.

.10 Do not proceed with grouting until minimum 48 hours after tile has set, to prevent displacement of tiles.

.11 Apply grout in accordance with grout manufacturer's directions to produce watertight, filled joints without voids, cracks and excess grout. Thoroughly compact and tool floor grout. Finish grout flush to edge thickness of tile and remove excess grout with soft burlap or sponge moistened with clean water.

3.9 **CLEANING**

.1 Clean off excess grout with soft burlap or sponge moistened with clean water.

.2 Polish floor and wall tile after grout has cured in accordance with TTMAC recommendations in the Maintenance Guide; do not use acid for cleaning.

.3 Apply 2 coats of sealer to unglazed ceramic floor tile in accordance with sealer manufacturer’s printed directions.

.4 Re-point joints after cleaning as required to eliminate imperfections, then re-clean as necessary. Avoid scratching tile surfaces.

3.10 **JOINT BACKING AND TILE SEALANT**

.1 Install joint backing under sealant as necessary.

.2 Install tile sealant around piping and fittings extending through tiled surfaces.

.3 Seal tile control joints.

.4 Seal internal tile to tile junctions. Tool to a smooth, flush surface, free from air bubbles and contamination.

3.11 **PROTECTION**

.1 Prevent traffic over tiled areas, and protect tiled assemblies from weather, freezing, and water immersion, for 72 hours minimum, after final installation.

.2 Prevent direct impact, vibration and heavy hammering on adjacent and opposite walls for 24 hours minimum, after final installation.

.3 Cover work temporarily with building paper properly lapped and taped at joints until work has been approved by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for wood flooring Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CSA A123.3, Asphalt or Tar Saturated Roofing Felt.

.2 CLA Grading Rules for Canadian Hardwood Strip Flooring.

.3 Master Painters' Institute (MPI), Painting Specification Manual.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standards, characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Samples: Submit two samples of strip flooring specified in accordance with Section 01 10 10.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Closeout submittals: Submit maintenance data and floor finish and care requirements for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10.

1.4 **QUALITY ASSURANCE**

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven acceptable experience on installations of similar complexity, size, and nature.

.2 Mock-up:
- .1 Construct one 4 m^2 mock-up of wood flooring including one inside corner and one outside corner in location acceptable to Consultant.
- .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
- .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.5 **DELIVERY, STORAGE, AND HANDLING**

.1 Store materials in fully enclosed ventilated, clean and dry storage space in areas of installation for minimum of 72 hours prior to commencing of work.

1.6 **SITE CONDITIONS**

.1 Do not install Work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
- .1 Ambient air and surface temperature: 18^0C to 21^0C.
- .2 Precipitation: None.
- .3 Relative Humidity: Not to exceed 45%.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 72 hours before, during, and 48 hours after installation.

.3 Maintain minimum temperature of 10°C and specified relative humidity within area of installation until final acceptance of building.

1.7 **MAINTENANCE**

.1 Submit extra 10% of gross floor area covered, for each pattern and type specified. Include sufficient amount of adhesive and finishing materials and installation and application instructions. Submit Products from same production run as installed products. Store maintenance Products as directed by Consultant.

2 Products

2.1 **MATERIALS**

.1 General:
- .1 Materials used for Work of this Section are to include, but not be limited to the following criteria:
  - .1 Regionally sourced materials.
  - .2 Certified wood.
  - .3 Low VOC content limits.
- .2 Adhesives - Urea-formaldehyde-free glues.
- .3 Material to be sourced regionally from within 800 km of jobsite wherever possible.

.2 Wood flooring: Wood flooring type to be selected by the Consultant.

.3 Nail down and unfinished wood flooring type:
- .1 Asphalt saturated felt: to CSA A123.3, No. 15 organic felt.
- .2 Nails: purpose designed barbed nails for power nailing.
- .3 Finish: Oil modified polyurethane conforming to MPI code INT 6.5C for premium grade finish.

.4 Glue down and prefinished wood flooring type:
- .1 Adhesive: type recommended by flooring materials manufacturer and compatible with curing compounds or sealer applied to underlayment or subfloors.

.5 Wood base: In accordance with Section 06 20 00.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Cover subfloor with Polyethelene membrane, lap joints 100 mm and seal with mastic.

3.3 **WOOD STRIP FLOOR INSTALLATION (nail down)**

.1 Install No. 15 felt directly below finish flooring.

.2 Install flooring parallel to long dimension of room. Locate centre axis so that no flooring unit is less than one-half size.

.3 Allow 12 mm expansion space at walls or projections in floor area and maintain 50 mm expansion space at perimeter of floor surface.

.4 Machine nail fastening. Maintain tight joints and board ends. Install to manufacturers written instructions.

.5 Install base continuously at floor perimeter. Secure to wall surface with screws and plugs. Ensure base does not contact floor surface and is not secured to it.

.6 Install thresholds at openings. Attach threshold to adjacent rigid floor surface. Threshold to act as ramp between floor surfaces over expansion space.

3.4 **WOOD STRIP FLOOR INSTALLATION (adhered)**

.1 Install wood flooring in accordance with manufacturer's written instructions.

.2 Install flooring parallel to long dimension of room. Locate centre axis so that no flooring unit is less than one-half size.

.3 Apply adhesive over subfloor in accordance with manufacturer's instructions.

.4 Apply no more adhesive than can be covered with flooring before working time expires.

.5 Allow no streaks or lumps in adhesive during application.

.6 Remove adhesive that has set or that has formed surface film before flooring is embedded. Apply fresh coat of adhesive.

.7 Apply flooring units with uniform pressure but avoid working adhesive into joints.

.8 Remove excess adhesive from flooring units.

.9 Install base continuously at floor perimeter. Secure to wall surface with screws and plugs. Ensure base does not contact floor surface and is not secured to it.

.10 Install thresholds at openings. Attach threshold to adjacent rigid floor surface. Threshold to act as ramp between floor surfaces over expansion space.

3.5 **FINISHING**

.1 Clean off any adhesive from surface using a damp cloth. If the adhesive has dried, scrape up carefully with a putty knife and wipe with damp cloth.

.2 Power sand floor surface smooth and true. Vacuum clean and remove dust.

.3 Apply sealer coat immediately after sanding.

.4 Apply two coats of floor finish. Permit to dry thoroughly prior to permitting any foot traffic.

3.6 **CLEANING**

.1 Clean flooring in accordance with manufacturer's instructions.

.2 Clean off any adhesive from surface using a damp cloth. If the adhesive has dried, scrape up carefully with a putty knife and wipe with damp cloth.

3.7 **PROTECTION**

.1 Protect new floors from after completion of floor finishing or set of adheisve until final inspection.

.2 Prohibit traffic on floor for 48 hours after installation. Protect Work of this Section from damage and debris until final inspection.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for resilient tile flooring Work and accessories in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

.2 ASTM F1066, Specification for Vinyl Composition Floor Tile.

.3 ASTM F1861, Specification for Resilient Wall Base.

.4 ASTM F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Cloride.

.5 ASTM F 2170, Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Samples:
- .1 Submit following samples in accordance with Section 01 10 10:
  - .1 Two 250 x 200 mm samples of each type of tile material and colour.
  - .2 Two 250 mm long samples of each base, accessory and colour.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Closeout submittals: Submit maintenance and cleaning data for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10.

1.4 **SITE CONDITIONS**

.1 Maintain air temperature and structural base temperature at flooring installation area above 20°C for 48 hr before, during and 48 hr after installation.

.2 Store materials for 2 days prior to installation in area of Work to achieve temperature stability.

.3 Do not lay flooring in conditions of high humidity or where exposed to cold drafts. In hot weather, protect from direct sunlight.

.4 Provide adequate ventilation during installation.

1.5 **MAINTENANCE**

.1 Submit extra 5% or to nearest full carton of each colour, pattern and type of flooring material and base required for maintenance use. Identify each carton. Store where directed.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, primers, adhesives, sealers, and waxes are to have low VOC content limits.

.2 Vinyl composition tile: ASTM F1066, vinyl composite tile types as selected by the Consultant.

.3 Rubber base: ASTM F1861, rubber wall base, in lengths as long as possible including premoulded end stops and inner and outer corners. Colour: As selected by Consultant. Rubber base type as selected by the Consultant.

.4 Reducing edge strips, transition strips, thresholds, etc.: Nitrile rubber plasticized vinyl, 80-95 Shore A Durometer, adhesive recommended by flooring manufacturer.
.1 ‘Finishing Accessories’ Johnsonite or approved alternative.

.5 Primers and adhesives: Low VOC, waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.

.6 Concrete skim coat compound: High-performance, rapid-setting cement based skim coating compound. 'Ultra SkimCoat' by Mapei or approved alternative for filling minor voids and leveling existing substrate.

.7 Sealer and wax: Type recommended by flooring manufacturer.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Ensure concrete floors meet the following minimum requirements and requirements of the flooring manufacturer. If there is a conflict between these requirements and those of the flooring manufacturer, the more stringent shall apply.
- .1 Internal Relative Humidity Test: Perform internal relative humidity testing in accordance with ASTM F2170. Results shall not exceed 80% RH.
- .2 Moisture Test: Moisture emissions from concrete subfloors (cured for a minimum of 28 days) must not exceed 3 lbs per 1000sf per 24 hours (1.4 kg H2O/24 hr/93 m2) for acrylic adhesive and 5lbs for polyurethane adhesive via the Calcium Chloride Test Method (ASTM F1869).
- .3 The pH level of the subfloor surface shall not be higher than 9.9. If higher, subfloor must be neutralized.

.3 Ensure that sub-floors have been provided as specified without holes, protrusions, cracks, depressions or other major defects.

.4 Ensure that control joints have been filled and levelled.

.5 Defective Work resulting from application to unsatisfactory surfaces will be considered the responsibility of those performing the Work of this Section.

3.2 **SUBFLOOR TREATMENT**

.1 Flooring shall be installed over subfloors conforming to ASTM F710 for concrete.

.2 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.3 Apply sub-floor filler to low spots and cracks to achieve floor level to a tolerance of 1:1000, allow to cure.

.4 Meet ASTM F710 Standard for Concrete or other monolithic floors.

.5 Clean and remove all deleterious materials from surfaces to receive this Work in accordance with the adhesive manufacturer's recommendations.

.6 Prime concrete to flooring manufacturer's printed instructions.

3.3 **RESILIENT TILE FLOORING APPLICATION**

.1 Install resilient tile flooring in accordance with manufacturer’s written instructions.

.2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive that can be covered by flooring before initial set takes place.

.3 Lay flooring with joints straight and parallel to building lines to produce symmetrical tile pattern. Install equal size perimeter tile on each side.

.4 Install flooring to square grid pattern with all joints aligned.

.5 As installation progresses, and after installation, roll flooring in 2 directions with minimum 45 kg minimum roller to ensure full adhesion.

.6 Remove adhesive seepage at seams or surface while adhesive is still wet, in accordance with manufacturer's recommendation.

.7 Cut tile and fit neatly around fixed objects.

.8 Install feature strips and floor markings where indicated. Fit joints tightly.

.9 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.

.10 Install reducing edge strips at unprotected or exposed edges where flooring terminates and at edges where there are two finishes of different thicknesses.

3.4 **RESILIENT BASE APPLICATION**

.1 Install resilient base in accordance with manufacturer’s written instructions.

.2 Lay out base to keep number of joints at minimum.

.3 Prior to installing base, fill cracks and irregularities with a filler recommended by base manufacturer.

.4 Set base in adhesive using a 3 kg hand roller, against wall and floor surfaces.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions.

.7 Cope internal corners.

3.5 **CLEANING AND WAXING**

.1 Forty-eight hours after installation, clean vinyl tile surfaces with a mild soap solution approved by finish manufacturer. Rinse clean, dry and apply 2 coats of wax. Polish thoroughly.

3.6 **PROTECTION OF FINISHED WORK**

.1 Protect floors from time of final set of adhesive until final waxing.

.2 Prohibit traffic on floor for 48 hours after installation.

.3 Cover waxed and polished surfaces with fibre reinforced, clean, non-staining kraft paper. Secure in position with gummed tape to prevent drifting. Remove covering when directed by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for waterproof flooring Work in accordance with the Contract Documents.

1.2 **SUBMITTALS**

.1 Product data:
- .1 Submit manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, characteristics, limitations, preparation, and installation requirements and techniques.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings indicating sections, details, materials, thicknesses, finishes, joint layout and locations, and coating terminations in accordance with Section 01 10 10.

.3 Samples: Submit two 300 x 300 mm samples, on cement board, of waterproof flooring in accordance with Section 01 10 10.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.5 Reports/Certificates:
- .1 Submit manufacturer's written acceptance of substrate prior to installation. Submit verification of moisture content of floor prior to installation.
- .2 Submit applicator’s current certificate of approval, for installation of waterproof flooring, by the material manufacturer as proof of compliance.
- .3 Submit letter certifying that materials proposed for use on this project meet criteria specified, are compatible with each other, and that the manufacturer recommended the product for it’s intended end use.
- .4 Submit certification from waterproofing flooring manufacturer that installation meets specified and manufacturer’s requirements.

.6 Closeout submittals: Submit maintenance data for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10.

1.3 QUALITY ASSURANCE

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in waterproof flooring installations of a similar size and nature and that is approved by manufacturer.

.2 Mock-up:
- .1 Construct 2 m^2 mock-up of waterproof flooring in location acceptable to Consultant.
- .2 Mock-up shall demonstrate the minimum standard for workmanship, material thicknesses, surface profile, flashing, and juncture details, slip resistance, and finished appearance.
- .3 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
- .4 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.
- .5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

.3 Pre-installation meetings: Arrange with Consultant, manufacturer's representative, and waterproof flooring applicator to inspect substrates, and to review installation procedures 48 hours in advance of installation.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.

.2 Store product in location protected from freezing, damage, construction activity, precipitation, and direct sunlight, in strict accordance with manufacturer's recommendations.

.3 Prior to application, condition products in accordance with manufacturer's recommendations.

.4 Handle all products with appropriate precautions and care as stated on Material Safety Data Sheet.

1.5 SITE CONDITIONS

.1 Do not install Work of this Section outside of manufacturer recommended environmental ranges without Consultant's and Product manufacturer's written acceptance.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 48 hours before, during, and 72 hours after installation.

1.6 **EXTENDED WARRANTY**

.1 Submit a extended warranty for Work of this Section in accordance with General Conditions, except that warranty period is extended to 2 years for the following:
- .1 Warrant against leaking, failure to stay in place, deformation, and breaking of watertight seals.
- .2 Coverage: Complete replacement including affected adjacent Work at no cost to Owner.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, coatings are to have low VOC content limits.

.2 Waterproof Flooring: Chemical resistant, solvent free, 100% solids epoxy coatings complete with aggregates broadcast for slip-resistant wearing surface. Locations: Locations to be where noted on drawings. 'Novolac AR170' by BASF or approved alternative.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance.

.3 Verify that specified environmental conditions are ensured before commencing work.

.4 Test substrate surfaces to ensure that moisture level and acid-alkali balance does not exceed limits recommended manufacturer. Provide one copy of tests results to Consultant prior to installation.

3.2 **PREPARATION**

.1 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from Work of this Section.

.2 Thoroughly clean all surfaces to receive coating by steel shotblasting or other method in accordance with manufacturer's written instructions.

.3 Remove projections and other conditions that may affect the installation of the coating.

.4 Fill open control joints, and other cracks and voids with material compatible with waterproof floor treatment materials.

.5 Clean prime and seal surfaces as recommended by waterproof flooring manufacturer.

3.3 **INSTALLATION**

.1 Install waterproof flooring in accordance with reviewed shop drawings and manufacturer's written instructions with manufacturer recommended roller or brush. Apply two 20 mil coats at a manufacturer recommended coverage rate.

.2 To make coating slip resistant, broadcast clean, dry sand into first coat while it is wet. Apply sand to the point of saturation as recommended by the coating manufacturer. When coating is dry, sweep excess sand and apply second coat of waterproofing.

.3 Stop waterproofing flooring in a straight line on each side of control/expansion joints.

.4 Apply waterproof flooring with care to ensure that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform colour, sheen and texture, all within limitations of materials and areas concerned.

.5 Make clean true junctions with no visible overlap between adjoining applications of waterproof flooring.

.6 Chase edge of adjacent floor systems so that waterproof flooring finishes flush with adjacent floor systems.

.7 At projections through floor post, pipes, vents and similar locations of potential movement, install a sealant bead and tool to form a cove and allow to cure prior to application of waterproof flooring.

.8 Apply waterproof flooring over entire floor areas and extend up vertical surfaces such as walls, columns and curbs to a height of 100 mm. Reinforce joint at floor with fibreglass scrim.

3.4 **REPAIR**

.1 Touch-up and refinish minor defective work. Refinish entire coated surface areas where finish is damaged or otherwise unacceptable.

3.5 **PROTECTION**

.1 Erect barriers to prevent the entry and presence of personnel not performing work of this Section during application of waterproof flooring, and for 48 hours following completion of application.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for concrete floor sealer. Work in accordance with the Contract Drawings.

1.2 **SUBMITTALS**

.1 Product data: Submit manufacturer's Product data in accordance with Section 01 10 10 indicating:
- .1 Two copies of manufacturer's Product data on characteristics, performance criteria, and limitations.
- .2 Preparation, installation requirements and techniques, Product storage, and handling criteria.

.2 Samples: Submit samples in accordance with Section 01 10 10 indicating coating and final concrete finish.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Reports: Submit manufacturer's acceptance of substrate prior to installation in writing. Submit verification of moisture content of floor prior to installation.

.5 Close-out submittals: Submit maintenance data for incorporation into Operations and Maintenance manuals.

1.3 **QUALITY ASSURANCE**

.1 Perform Work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator’s current certificate of approval by the material manufacturer as proof of compliance.

.2 Mock-up:
- .1 Construct one 2 m^2 mock-up of floor sealer in location acceptable to Consultant.
- .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.

.3 Mock-up may remain as part of Work if accepted by Consultant. If sealer application is unacceptable to Consultant, rework sealer in accordance with manufacturer's recommendations to provide a sealed concrete surface acceptable to Consultant.

.4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

.3 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review Mock-up and installation procedures 48 hours in advance of installation.

1.4 SITE CONDITIONS

.1 Do not install the Work of this Section outside of environmental ranges as recommended by the manufacturer without Product manufacturer's written acceptance and as follows:

.1 Relative Humidity: In accordance with manufacturers' requirements.

.2 When no dust is being raised.

.3 In well-ventilated and broom clean areas.

.2 Install temporary protection and facilities to maintain the Product manufacturer's, and the above specification, environmental requirements for 24 hours before, during, and 24 h after installation.

.3 Post do not enter and appropriate warning signs at conspicuous locations.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Store materials at site in an area specifically set aside for purpose that is locked, ventilated, and maintained at a minimum temperature of 16°C.

.2 Ensure that health and fire regulations are complied with in storage area, and during handling and application.

1.6 EXTENDED WARRANTY

.1 At completion of this work, provide a signed Sealant and Waterproofing Association warranty to the Owner covering defects of workmanship and materials for a period of 2 years commencing from Contract Completion. Agree to make good promptly any defects which occur or become apparent within the warranty period in conjunction with the membrane manufacture's warranty. Defects shall include but not be limited to leakage, deformation and failure to stay in place. Coverage includes complete replacement including affected adjacent Work at no cost to Owner.

2 Products

2.1 **MATERIALS**

.1 All materials under Work of this Section, including but not limited to, sealers and coatings are to have low VOC content limits.

2. Each material used in the application of each flooring system shall be as recommended or manufactured by the supplier of the flooring system.

.3 Concrete floor sealer: Alkali-silicate, water-soluble, inorganic concrete hardener and dustproofer; 'Kure-N-Harden' by BASF Building Systems or approved alternative by Sika Canada Inc. Locations to be where noted on drawings.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Verify that concrete floor has cured 28 days minimum and that substrate is acceptable to sealer manufacturer.

.3 Test surfaces for moisture content to ensure that they are suitable for application.

3.2 **PREPARATION**

.1 Prepare substrate in accordance with manufacturer's written instructions. Diamond grind and vacuum substrate free of debris and dust.

.2 Project adjacent surfaces from damage resulting from Work of this section. Mask and/or cover adjacent surfaces, fixtures, and equipment as necessary.

.3 Clean surfaces to be sealed as recommended by sealer manufacturer.

3.3 **APPLICATION**

.1 Apply concrete floor sealer in accordance with manufacturer's written instructions. Sealer manufacturer shall supervise application.

.2 Spray apply concrete sealer to entire surface and keep from drying for 30 minutes as recommended by manufacturer.

.3 Sprinkle surface with water as sealer begins to penetrate (after 30 minutes).

.4 Flush surface with water and drying begins to remove excess material. Allow to harden for 24 hours.

.5 Lightly buff floor with a commercial floor buffer and non-aggressive pad to bring up required sheen.

.6 Apply second coat of concrete sealer following same procedures as first layer.

3.4 **CLEANING**

.1 Remove promptly as work progresses spilled or spattered materials from surfaces of work performed under other Sections. Clean floors on completion of work. Do not mar surfaces while removing.

3.5 **PROTECTION**

.1 Erect barriers to prevent the entry and presence of personnel not performing work of this Section during application of floor sealer, and for 48 hours following completion of application.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for carpet Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 Canadian Carpet Institute (CCI), Contract Carpet Manual, No. 001.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit two copies of manufacturer's Product data for each product specified in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings indicating carpeted floor areas, carpet selection, pile direction, location and direction of seams, cross joints, and other details required by Consultant to clarify work in accordance with Section 01 10 10.

.3 Samples: Submit duplicate 300 mm square pieces of each type carpet specified, 150 mm lengths of moulding in accordance with Section 01 10 10.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.5 Certification:
- .1 Submit certification that carpet has been tested and passed the Indoor Air Quality (IAQ) Carpet Testing Program requirements of the Canadian Carpet Institute.
- .2 Four weeks after Notification of Award, Submit certification from carpet manufacturer that carpet has been ordered.
- .3 Submit program parameters for recycling.

.6 Closeout submittals: Submit maintenance and cleaning data for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10.

1.4 **SITE CONDITIONS**

.1 Do not install Work of this Section when the ambient air and surface temperature is below 18^0C or above 40^0C without Consultant's and Product manufacturer's written acceptance.

.2 Supply and install temporary protection and facilities to maintain Product manufacturer's, and above specified environmental requirements for 24 hours before, during, and 24 hours after installation.

1.5 **MAINTENANCE**

.1 Submit extra 3% each colour, pattern and type of flooring material required for maintenance use. Extra materials to be from same production run as installed materials and clearly labelled. Provide in one continuous full width roll. Store where directed.

.2 Upon completion of the work of this Section, bundle and wrap all large remnant pieces of carpet remaining and store where directed by Consultant.

2 Products

2.1 **MATERIALS**

.1 General:
- .1 All materials under Work of this Section, including but not limited to, adhesives are to have low VOC content limits.
- .2 All carpeted areas must meet or exceed the requirements of the Carpet Rug Institute's (CRI) Green Label Indoor Air Quality Test Program.

.2 Carpet : Carpet type to be selected by Consultant.

.3 Seaming tape: Types recommended by carpet manufacturer for purpose intended.

.4 Adhesive: Non-release type: recommended by carpet manufacturer for direct glue down installation, low odour, free of volatile hydrocarbons such as toluene and mineral spirits.

.5 Reducing edge strips, thresholds: Nitrile rubber plasticized vinyl, 80-95 Shore A Durometer, adhesive as recommended by manufacturer.

.6 Thresholds:
- .1 Provide carpet threshold 'CD-XX' by Johnsonite or approved alternative where carpets of different colours meet.
- .2 Provide carpet threshold 'VT-XX-M' by Johnsonite or approved alternative where carpet abuts edge of ceramic/porcelain tile.
- .3 Provide carpet threshold 'CTA-XX' by Johnsonite or approved alternative where carpet abuts resilient tile and sheet flooring.

.4 Provide carpet threshold ‘EG-XX’ by Johnsonite or approved alternative at exposed carpet edges.

.7 Carpet protection: Non-staining heavy duty kraft paper.

.8 Base: In accordance with Section 09 65 19.

.9 Concrete skim coat compound: High-performance, rapid-setting cement based skim coating compound. 'Ultra SkimCoat' by Mapei or approved alternative for filling minor voids and leveling existing substrate.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Verify substrate surfaces are solid, free from surface water, dust, oil, grease, scaling or laitance, projections and other foreign matter detrimental to performance.

.2 Repair depressions and cracks with latex base compound or water putty crack filler. Sweep and vacuum surfaces before laying carpet.

.3 Pre-condition carpeting following manufacturer's printed instructions.

.4 Ensure toeless type resilient base has been installed before proceeding with carpeting.

3.3 **INSTALLATION**

.1 Install floor carpet in accordance with pattern layout and reviewed shop drawings, manufacturer's printed instructions and in accordance with Contract Carpet Manual, Standard for Installation of Textile Floor covering Materials No. 001.

.2 Adhesive method:
.1 Apply adhesive and install carpeting in accordance with manufacturer's written instructions by direct glue-down method. Install carpet with pile in same direction throughout a given floor area. Install carpeting using minimum of pieces.
.2 Spread full bed of adhesive evenly over substrate surfaces and install floor carpet over adhesive. Roll carpet on horizontal surfaces with approved type roller to remove air pockets, ripples and other defects.

.3 Finish installation to present smooth wearing surface free from mis-alignment, lifting, burring and other faults.

.4 Use material from same dye lot. Ensure colour, pattern and texture match within any one visual area. Maintain constant pile direction.

.5 Fit neatly around architectural, mechanical, electrical and telephone outlets, and furniture fitments, around perimeter of rooms into recesses, and around projections.

.6 Seal edges of cut-outs with latex, or use positive binding method.

.7 In areas where carpet is laid and underfloor duct and junction boxes occur, cut carpet at boxes to provide a hinged flap over junction boxes. Secure access locations with 'Velcro' strip around three sides of flap, to provide a flush carpet surface.

.8 Continue carpeting through passageways and extend carpet into recesses, such as closets, and under movable casework, equipment and other movable items.

.9 Join all seams by seaming adhesive method in strict accordance with manufacturer's instructions. Unless otherwise approved by Consultant, cross joints will not be permitted. Maintain run of pile directionally constant.

.10 Terminate carpeting at centerline of door, in closed position, in openings where adjacent floor finish or colour is dissimilar.

.11 Install base in accordance with Section 09 65 19.

3.4 **CLEANING AND PROTECTION**

.1 Vacuum carpets clean immediately after completion of installation. Protect traffic areas.

.2 Prohibit traffic on carpet until adhesive is cured.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for painting Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CAN/CGSB 85.10, Protective Coatings for Metals.

.2 CAN/CGSB-85.100, Painting.

.3 Master Painters Institute (MPI), Painting Specification Manual.

.4 SSPC Steel Structures Painting Council, Standards.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
  - .2 Product transportation, storage, handling and installation requirements.
- .2 Submit listing of manufacturer's Product types, Product codes, and Product names, number of coats, and dry film thicknesses, corresponding to each Painting Schedule code; submit listing minimum of 8 weeks before materials are required.

.2 Samples:
- .1 Submit following samples in accordance with Section 01 10 10.
  - .1 Three 300 x 150 mm draw downs of each colour minimum 4 weeks before paints are required.
  - .2 Identify each sample with Contract number and title, colour reference, sheen, date, and name of applicator.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certificates:
- .1 Submit certified documentation to confirm each airless spray painter has minimum of 5 years experience on applications of similar complexity and scope.
- .2 Submit certified documentation to confirm each worker has Provincial Tradesman Qualification certificate of proficiency.

.5 Reports:
- .1 Submit written field inspection and test report results after each inspection.
- .2 Submit Field Quality Control test result reports for alkali content, substrate moisture, and dry film thickness.
- .3 Submit electronic moisture meter manufacturer's specifications including tolerances. Submit record of latest meter calibration to meet manufacturer's recommendations.

1.4 QUALITY ASSURANCE

.1 Design standards: Perform work of this section in strict compliance with the Toronto Municipal Code; Chapter 629 'Property Standards'.

.2 Finishing Work: Perform work to MPI requirements for premium grade.

.3 Supervision: Have Work supervised by a full-time qualified foreperson who has 10 years minimum experience on Contracts of similar complexity and scope.

.4 Mock-up:
- .1 Construct three 4 m^2 mock-ups of different Paint Schedule code systems, selected by Consultant, in locations acceptable to Consultant to demonstrate installation workmanship, colour, and hiding power of Products.
- .2 Obtain Consultant's acceptance in writing before proceeding with the Work of this Section.
- .3 Mock-ups may remain as part of the Work if acceptable to Consultant and will serve as a standard for similar code systems.
- .4 Repaint over mock-ups which do not form part of the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Install correct, safe temporary storage for paint, thinner, solvents, and other volatile, corrosive, hazardous, and explosive materials in accordance with requirements of authorities having jurisdiction.

.2 Post hazard warning signage in areas of storage and mixing. Install and maintain sufficient CO_2 fire extinguishers of minimum 9 kg capacity, accessible in each storage mixing and storage areas.

.3 Maintain storage enclosures at minimum 10°C ambient temperature and to manufacturer's instructions.

1.6 SITE CONDITIONS

.1 Apply coatings under the following conditions:
- .1 Exterior coatings (except Latex): 5° C minimum.
- .2 Exterior latex coatings: 10°C minimum.
- .3 24 hours minimum after rain, frost, condensation, or dew.
- .4 When no condensation is possible (unless specifically formulated against condensation).
- .5 Interior coatings: 7°C minimum.
- .6 Relative humidity: 85% maximum.
- .7 Not in direct exposure to sun light.

.2 Maintain temperature conditions indicated above for 24 hours before, during and 24 hours after painting.

.3 Install clean plywood sheets to protect floors and walls in storage and mixing areas, from paint drips, spatters, and spills.

.4 Apply sufficient masking, clean drop cloths, and protective coverings for full protection of Work not being painted including, but not limited to, the following:
- .1 Light fixtures, fire and smoke detectors.
- .2 Sprinkler heads.
- .3 Prepainted diffusers and registers.
- .4 Prepainted equipment.
- .5 Fire rating labels and equipment specification plates.
- .6 Finished surfaces.

1.7 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

1. Provide paint products meeting MPI "Green Performance Standard GPS-1-05".

1.8 MAINTENANCE

1. Deliver to Owner's place of storage on completion of work, sealed containers of each finish painting material applied, and in each colour. Label each container as for original, including mixing formula. Provide the following:
   - .1 1 L of extra materials when less than 50 L are used for Project;
   - .2 3.78 L of extra stock when 50 to 200 L are used;
   - .3 7.57 L of extra stock when over 200 L are used.

2 Products

2.1 **MATERIALS**

.1 Paint:
- .1 All materials under Work of this Section, including but not limited to, primers, stains, and paints are to have low VOC content limits.
- .2 Products in accordance with the MPI Painting Specification Manual, Exterior and Interior Systems;
  - .1 Manufacture's premium grade, first line Products.
  - .2 Uniform dispersion of pigment in a homogeneous mixture.
  - .3 Ready-mixed and tinted whenever possible.
- .3 Products within each MPI paint system code: From single manufacturer.
- .4 Acceptable manufacturers:
  - .1 Benjamin Moore.
  - .2 Dulux Paints/PPG.
  - .3 Para Painting & Coatings.
  - .4 Sherwin Williams.

.2 Exterior galvanized steel: 2-step epoxy paint system by PPG Canada Industries Limited.
- .1 Fast dry-multipurpose high build epoxy; Amercoat 370 by PPG Canada Industries Limited.
- .2 Semi-gloss acrylic asphaltic polyurethane; Amercoat 450HSG by PPG Canada Industries Limited.

.3 Slip-resistant special coating (balconies): Pigmented one component acrylic copolymer based on methacrylate resins; Durex Dur-A-Seal A50 by Durabond.

2.2 **COLOUR SCHEDULE**

.1 Consultant will select choice of colours and gloss when compiling a Colour Schedule after award of Contract; allow for colour selection beyond paint manufacturer's standard colour range.

.2 Refer to Colour Schedule for selected colour references.

.3 Conform to gloss reflectance definitions listed in MPI Specification Manual.

2.3 **PAINTING AND FINISHING SCHEDULE**

.1 Refer to Table 1, MPI Painting and Finishing Schedule coded systems, comply with MPI Painting Specification Manual.

Table 1: Painting and Finishing Schedule

EXTERIOR SUBSTRATES	Typical substrates (Including but not limited to)	MPI Manual Ref.	MPI Finish System Code	Topcoat
Structural steel and metal fabrications		EXT 5.1	EXT 5.1D	Alkyd
Galvanized steel	HM doors & frames, handrails	EXT 5.3	EXT 5.3B	Alkyd
INTERIOR SUBSTRATES	Typical substrates (Including but not limited to)	MPI Manual Ref.	MPI Finish System Code	Topcoat
Concrete block masonry		INT 4.2	INT 4.2A	Latex
Structural steel (Factory primed)		INT 5.1	INT 5.1R	Acrylic
Metal Fabrications (Factory primed)	Steel ladders	INT 5.1	INT 5.1R	Acrylic
Steel (High heat)	Boilers, pipes, flues, heat exchangers	INT 5.2	INT 5.2A	Silicone acrylic
Galvanized steel	Ducts, pipes	INT 5.3	INT 5.3A	Latex
Galvanized metal	HM doors & door frames, handrails	INT 5.3	INT 5.3B	WB light industrial coating
Dressed lumber	Doors and frames requiring paint finish	INT 6.3	INT 6.3A	High performance latex
Dressed lumber	Doors and frames requiring stain finish	INT 6.3	INT 6.3D	Alkyd varnish
Dressed lumber	Doors requiring clear finish	INT 6.3	INT 6.3K	Poly-urethane
Wood paneling & casework	Partitions, panels, millwork	INT 6.4	INT 6.4C	Semi-transparent stain

Table 1: Painting and Finishing Schedule				
Wood paneling & casework	Partitions, panels, millwork	INT 6.4	INT 6.4E	Poly-urethane
Gypsum board,	Drywall, walls, ceilings	INT 9.2	INT 9.2A	Latex
Gypsum board,	Wet areas	INT 9.2	INT 9.2F	Epoxy-modified latex

3 Execution

3.1 **EXAMINATION**

.1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 General:
- .1 Clean substrate surfaces free from, dust, grease, soiling, or extraneous matter, which are detrimental to finish.
- .2 Patch, repair, and smoothen minor substrate defects and deficiencies e.g. machine, tool and sand paper marks, shallow gouges, marks, and nibs.
- .3 Clean, sweep, and vacuum floors and surfaces to be painted, debris and dust-free prior to painting.
- .4 Refer to MPI Painting Specification Manual for surface preparation requirements of substrates not listed here.

.2 Where finish hardware has been installed remove, store, re-install finish hardware, to accommodate painting. Do not clean hardware with solvent that will remove permanent lacquer finishes.

.3 Alkali Content tests and neutralization:
- .1 Test for ph level using litmus paper on dampened substrate.
- .2 Neutralize surfaces over 8.5 ph with 4% solution of Zinc Sulphate for solvent based systems and tetrapotassium pyrophosphate for latex based systems, to below 8.0 ph, and allow to dry.
- .3 Brush-off any residual Zinc Sulphate crystals.
- .4 Coordinate paint system primer / sealer to be alkali-resistant.

.4 Substrate moisture tests:
- .1 Test for moisture content over entire surface to be painted, minimum one test/ 2 m^2 in field areas and one test/600 mm along inside corners including at ceiling to wall juncture.
- .2 If any test registers above 10% allow entire substrate surfaces, within the plane, to dry further before paint system application. Install temporary drying fans if necessary.
- .3 Re-test employing same criteria.

.5 Mildew removal: Scrub with solution of trisodium phosphate and sodium hypochlorite (Javex) bleach, rinse with water, and allow to dry completely.

.6 Cementitious and masonry (Concrete, block):
- .1 Allow 28 days cure before painting.
- .2 Coordinate repair of protrusion-chipping and grinding, and honeycomb filling with responsible trades.
- .3 Remove dirt, loose mortar, scale, powder, efflorescence, and other foreign matter.
- .4 Remove form oil and grease with trisodium phosphate, rinse, and allow to dry thoroughly.
- .5 Prepare surfaces in accordance with CAN/CGSB-85.100.
- .6 Remove rust stains with solution of sodium metasilicate after thorough wetting; allow to dry thoroughly.

.7 Galvanized steel sheet:
- .1 Z275 (Satin & Spangled Sheet): SSPC SP7 brush blast.
- .2 ZF075 (Wiped Coat): Remove contamination, wash with Xylene solvent.
- .3 Touch-up damaged galvanized areas with organic zinc rich primer.

.8 Galvanized iron and steel: Prepare galvanized and ungalvanized metal surfaces according to CAN/CGSB-85.10.
- .1 Unpassivated, unweathered and weathered: Remove contamination, wash with Xylene or Toluol solvent, allow to dry thoroughly. Make paint system primer/sealer an etching type primer.
- .2 Manufacturer pre-treated (including passivated): SSPC SP7.
- .3 Touch-up damaged galvanized areas with organic zinc rich primer.

.9 Structural steel and miscellaneous metal fabrications:
- .1 Coordinate the following with the responsible trades:
  - .1 Rust, mars, mill scale, and weld-burn touch-ups.
  - .2 Oil, grease, weld flux and other residue removal.
- .2 Prime paint items, not otherwise indicated to be primed as part of another Section.
- .3 Touch-up damaged galvanized areas with organic zinc rich primer.

.10 Wood and Millwork:
- .1 Wood surfaces to be clean and dry with a moisture content of less than 15%.
- .2 Remove foreign matter prior to prime coat; spot coat knots, pitch streaks and sappy sections with sealer.

.3 Fill nail holes and fine cracks after primer has dried.
.4 Backprime interior and exterior woodwork.

.11 Factory primed surfaces:
.1 Touch up damaged areas.
.2 Clean as required for top coat.

.12 Gypsum board:
.1 Apply primer/sealer paint to reveal defects and deficiencies and to equalize absorption areas.
.2 Coordinate repairs and touch-ups with the responsible trade.
.3 Re-prime repairs.

.13 Coordinate with other trades to prevent:
.1 Damage, and inadvertent activation of fire and smoke detectors.
.2 Odour and dust distribution by permanent HVAC systems including fouling of ducts and filters.

.14 Field-mix Products in accordance with manufacturer's written instructions.

3.3 APPLICATION

.1 Apply painting systems in accordance with the MPI Painting Specification Manual. Apply each Product to manufacturer's recommended dry film thickness.

.2 Painting systems listed are required minima, apply additional coats if necessary to obtain substrate hiding acceptable to the Consultant.

.3 Tint intermediate coats lighter than final top coats for identification of each succeeding coat and to facilitate inspections. Include only manufacturer's recommended reducing and tinting accessories. Do not add adulterants.

.4 Primer to be specialized primer coating system as required by manufacturer for selected colour. Standard primer being tinted shall be tinted to a maximum of 1.5% by volume.

.5 Sand lightly between coats to achieve a tooth or anchor for subsequent coats.

.6 Apply paint uniformly in thickness, colour, texture, and gloss, as determined by the Consultant under adequate illumination and viewed at a distance of 1500 mm. Apply finishes free of defects in materials and application which, in the opinion of the Consultant, affect appearance and performance. Defects include, but are not limited to:
.1 Improper cleaning and preparation of surfaces.
.2 Entrapped dust, dirt, rust.
.3 Alligatoring, blisters, peeling.
.4 Scratches, blemishes.
.5 Uneven coverage, misses, drips, runs, and poor cutting in.

.7 Do not apply coatings on substrates which are not sufficiently dry. Unless indicated otherwise, allow each painting system coat to cure dry and hard before following coats are applied.

.8 Repaint entire areas of damaged or incompletely covered surfaces, to the nearest inside or outside corner; patching will not be permitted.

.9 Miscellaneous painting requirements:
- .1 Paint projecting ledges, and tops, bottoms and sides of doors both above and below sight lines to match adjacent surfaces.
- .2 Paint door frames, access doors and frames, door grilles, prime coated butts, and prime coated door closers to match surface in which they occur.
- .3 Finish closets and alcoves as specified for adjoining rooms.
- .4 Paint light coves white whether a light lense is installed or not, unless otherwise indicated.
- .5 Paint interior columns to match walls of room.
- .6 Allow for:
  - .1 2 wall colours per room, one ceiling colour per room.
  - .2 Different door colours in each functionally different area.
  - .3 Different colours on both sides of same door.

.10 Mechanical, electrical and other painting coordination:
- .1 Paint mechanical services in accordance with Mechanical Identification Division 21, 22 and 23.
- .2 Coordinate painting of pipes, ducts, and coverings with the Work of Division 21, 22 and 23 to precede pipe colour banding, flow arrows, and other pipe identification labeling installation.
- .3 Paint exposed conduit, pipes, hangers, ductwork, grilles, gratings, louvres, access panels, fire hose cabinets, registers, convector and radiator covers, enclosures, and other mechanical and electrical equipment including services concealed inside cupboard and cabinet Work; apply colour and sheen to match adjacent surfaces, except as noted otherwise.
- .4 Paint portions of surfaces such as duct interiors, piping, ductwork, hangers, insulation, walls, and similar items, visible through grilles, louvres, convector covers etc., matte black in colour.
- .5 Remove the following to accommodate painting, carefully store, clean, then re-install on completion of each area and when dry:
  - .1 Switch and receptacle plates, fittings and fastenings, grilles, gratings, louvres, access panels, convector covers, and enclosures .

3.4 FIELD QUALITY CONTROL

.1 Dry film thickness tests:
- .1 Test for film thickness over entire surface to be painted, minimum one test/2 m^2 in field areas and one test/600 mm along inside corners including at ceiling to wall juncture.
- .2 If any test registers below specified thickness, re-apply paint to entire surface to nearest inside and outside corners.

.3 If test registers more than 50% above specified thickness, consult with paint manufacturer, determine if problem exists, offer solutions to Consultant, and repair as directed.

.4 Re-test employing same criteria after repair.

3.5 **CLEANING**

.1 Remove spilled, splashed, and spattered paint promptly as Work proceeds and on completion of Work. Clean surfaces soiled by paint spillage and paint spatters. Repair or replace damaged Work, as directed by Consultant.

3.6 **PROTECTION**

.1 Post Wet Paint signs during drying and restrict or prevent traffic where necessary.

.2 Post sign, after Consultant's inspection and acceptance of each room, reading: PAINTING COMPLETE - NO ADMITTANCE WITHOUT CONTRACTOR'S PERMISSION.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for textured ceiling finish Work.

1.2 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Sample: Submit sample of spray textured finish on 400 x 400 x 12.5 mm thick cement board for Consultant's approval in accordance with Section 01 10 10.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.3 **QUALITY ASSURANCE**

.1 Qualifications: Execute the Work of this Section by skilled, qualified, and experienced workers trained in the installation of the Work of this Section.

.2 Mock-up:
- .1 Construct one 4 m^2 mock-up of spray textured finish in location acceptable to Consultant.
- .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
- .3 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.4 **SITE CONDITIONS**

.1 Do not begin Work of this Section until:
- .1 Substrate and ambient temperature is above 15°C.
- .2 Relative humidity is below 80 %.

.3 Ventilation is adequate to remove excess moisture.

.2 Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 24 h before, during, and 24 h after installation.

2 Products

2.1 **MATERIALS**

.1 Spray Texture Finish:
- .1 Asbestos free, powder product formulated with polystyrene aggregate having superior resistance to fissure cracking
- .2 Degree of texture to match Consultant's approved sample.
- .3 Location: Provide spray texture finish at concrete ceilings as indicated and any additional areas as indicated by Consultant.
- .4 Acceptable product and manufacturer: 'Sheetrock Texture Finish' as manufactured by CGC Inc. or approved alternative.

.2 Levelling compound: As recommended by textured finish manufacturer.

.3 Cleaning agents: As recommended by textured finish manufacturer.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Allow new concrete ceilings and new concrete patches or repairs to age at least 60 days.

.2 Remove form oils, efflorescence, grease and other deposits from all concrete surfaces.

3.3 **APPLICATION**

.1 Apply spray texture finish in accordance with manufacturer's recommendations to match approved sample.

.2 Finish patched and repaired areas to provide a uniform texture and surface.

.3 Grind down ridges or other protrusions to the same level as adjacent surfaces; remove all grinding sludge and dust.

.4 Fill depressions and surface irregularities with manufacturer recommended cover coat levelling compound.

.5 When surfaces are prepared and dry, apply a full coat of a good quality flat white interior latex paint over entire surfaces to receive spray texture finish, unless otherwise indicated.

.6 Allow to dry before applying spray texture finish.

.7 Spray apply finish with manufacturer recommended equipment at coverage rate in accordance with manufacturer's written instructions.

3.4 **CLEANING**

.1 Wash all equipment immediately after use with water containing household detergent, unless otherwise recommended by texture finish manufacturer.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment, tools, supervision, and services necessary for wire mesh partition Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CAN/CSA-G40.21, Structural Quality Steels.

.2 CSA G30.5-M, Welded Steel Wire Fabric for Concrete Reinforcement.

1.3 **SUBMITTALS**

.1 Product data: Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10.

.2 Shop drawings: Submit shop drawings in accordance with Section 01 10 10 indicating partition panel modules and types, materials, gauges, finishes, door and other openings, hardware, fastening methods to adjacent structure, and assembly methods.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

2 Products

2.1 **MATERIALS**

.1 Partition mesh: Welded steel wire fabric conforming to CSA G30.5-M, longitudinal wire size MW 9.1, transverse wire size MW 9.1, opening size 50 x 50 mm, provide in flat sheets.

.2 Steel components: to CAN/CSA-G40.21, Grade 350W.
- .1 Posts: hollow steel tubing, square 50 x 50 mm square, minimum wall thickness 2 mm, welded construction, designed to fasten to floors, walls, and ceiling.
- .2 Angle frame: 32 x 32 x 3 mm.

.3 Bolts, fasteners and fastening hardware: manufacturer's standard to suit design and application.

2.2 **FABRICATION**

.1 Verify dimensions of existing Work before commencing fabrications and report discrepancies to Consultant.

.2 Fabricate Work in accordance with Contract Drawings and reviewed shop drawings.

.3 Fabricate Work free from defects impairing function, appearance, strength and durability.

.4 Panels: fabricate typical side panels of 500 mm wide x room ceiling height complete with special sizes or shapes as required to suite layout indicated on drawings. Weld mesh to angle frame at 100 mm o.c.. Mitre and weld frame corners.

.5 Posts: Length required to span between floor and ceiling complete with floor and ceiling plates. Include corner, wall, door and other special posts to manufacturer's standard.

.6 Swing doors:
.1 Standard doors: 900 mm wide x room ceiling height. Reinforce door with 40 x 5 mm or equivalent flat bar centre rail and 20 x 6 mm or equivalent flat bar bracing from centre rail to opposite corners on hinge side.

.7 Swing door hardware:
.1 Equip all doors with stops, keeper, hasp for padlock.
.2 Equip standard doors with 1-1/2 pair of butts.

2.3 **FINISHES**

.1 After fabrication, clean and paint all components with manufacturer's standard primer and 2 coat enamel finish in accordance with Section 09 91 00. Colour to be selected by Consultant.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install mesh enclosures and doors in accordance with reviewed shop drawings and manufacturer's printed instructions.

.2 Erect enclosures plumb, level, straight, rigidly supported, and securely fastened to abutting surfaces, free from superimposed loads.

.3 Install doors and adjust for proper closing, locking and smooth operation.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services for washroom accessories Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A167, Specification for Stainless Steel and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM A312, Specification for Seamless and Welded Austenitic Stainless Steel Pipes.

.3 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

.4 CAN/CSA B651-M, Barrier Free Design.

1.3 **SUBMITTALS**

.1 Product data: Submit Product data to requirements of Section 01 10 10 indicating each washroom accessory describing size, finish, details of function, attachment methods, hardware and locks, description of rough-in frame, and building-in details of anchors for grab bars.

.2 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.3 Closeout submittals:
- .1 Submit for each Product operation and maintenance instructions for incorporating into the Operations and Maintenance Manuals in accordance with Section 01 10 10.
  - .1 Supply 2 keys for each lockable washroom accessory to Consultant.
  - .2 Master key washroom accessories which are keyed.

1.4 **DELIVERY, STORAGE AND HANDLING**

.1 Deliver materials in sealed cartons and containers with manufacturer's name and product description clearly marked.

1.5 **EXTENDED WARRANTY**

.1 Submit a extended warranty for washroom accessories Work in accordance with the General Conditions, except that the warranty period is extended to 10 years.
- .1 Against cracked or scratched mirrors, spoiling or deterioration of silvering or backing, loosening of fastenings or adhesive
- .2 Coverage: complete replacement including effected adjacent Work.

1.6 **MAINTENANCE**

1. Maintenance Tools: Provide special tools necessary for accessing, assembly/disassembly or removal of toilet, bath and cleaning accessories in accordance with requirements specified in Section 01 10 10.

2 Products

2.1 **MATERIALS**

.1 Stainless steel:
- .1 Sheet metal: ASTM A167, Type 304.
- .2 Tubing: ASTM A312, Type 304.

.2 Sheet steel: ASTM A653M, Z275; Cold rolled, commercial quality, surface preparation and pretreatment as required for applied finish.

.3 Fasteners, screws and bolts: ASTM A167, Type 304 stainless steel, tamper-proof.

2.2 **ACCESSORIES**

.1 The following Products are by Bobrick Washroom Equipment of Canada Ltd. except where noted. Quantity and location of accessories as shown on Contract Drawings. Alternatives by American Specialties Inc./Watrous will be considered provided they are approved prior to purchase.

.2 Toilet tissue dispenser:
- .1 #B-2892; Surface mounted, double twin jumbo roll dispenser.
- .2 Finish: Type 304 stainless steel with satin finish.

.3 Toilet tissue dispenser (suites):
- .1 #B-667 by Bobrick or #7402 by ASI/Watrous; Recessed, single roll dispenser, chrome plated plastic spindle.
- .2 Finish: Type 304 stainless steel with satin finish.

.4 Feminine napkin disposal:
- .1 #B-270; self closing disposal opening, stainless steel wall box and waste receptacle, full length stainless steel hinge.
- .2 Finish: Type 304 stainless steel with satin finish.

.5 Soap dispenser: Liquid soap dispenser with nickel chrome finish, 'TESIADC-05' by Toto or approved alternative.

.6 Hand Dryer:
- .1 Surface mounted, automatic hand dryer by Saniflow or approved alternative, one-piece, deep-drawn, steel cover, motor shall be 1/3 hp with sealed ball bearings and automatic thermal overload.
- .2 Finish and colour: White epoxy finish.
- .3 'Speedflow Model MO6A' by Saniflow or approved alternative.

.7 Towel bar:
- .1 #B-6737; 455 mm long, complete with concealed mounting bracket.
- .2 Finish: Type 304 stainless steel with satin finish.

8. Shower curtain rod:
- .1 #B6047; 30 mm diameter, 1.2 mm thick tube, complete with 65 mm square flanges, #B204-1 stainless steel curtain hooks. Length as indicated on drawings.
- .2 Finish: Type 304 stainless steel satin finish.

.9 Grab bar:
- .1 Series B-5806.99; 30 mm diameter, 1.2 mm thick, concealed mounting with snap flange, complete with escutcheons. Lengths and configurations as indicated on drawings.
- .2 Finish: Type 304 stainless steel with a satin finish and peened grip.

.10 L-Shaped Grab bar:
- .1 ASI 3807-4P for B-F washrooms and ASI 3807-5P for B-F showers by ASI Group Canada or approved alternative; 38 mm diameter, 1.2 mm thick, concealed mounting with snap flange, complete with escutcheons. L-shape and Left and Right handed as indicated on drawings.
- .2 Finish: Type 304 stainless steel with a satin finish and peened grip.

.11 Mirror: 6 mm thick, mirror quality float glass
- .1 #B-290 Series; corners heliarc welded, ground and polished smooth.
- .2 Dimensions: Sizes and locations as indicated on the Contract Drawings.
- .3 Frame finish: Type 304 stainless steel satin finish.

.12 Mirror (Tilt): 6 mm thick, mirror quality float glass.
- .1 #B-293 Series; corners heliarc welded, beveled, ground and polished smooth.
- .2 Dimensions: Sizes and locations as indicated on the Contract Drawings.
- .3 Frame finish: Type 304 stainless steel satin finish.

.13 Folding Shower seat:
- .1 #B-5191; surface wall mounted seat with 8 mm thick water-resistant, ivory coloured solid phenolic.
- .2 Dimensions: 365 mm deep x 455 mm wide.
- .3 Finish: Type 304 stainless steel frame.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Verify and coordinate templates, inserts, and rough-in frames and verify exact location of washroom accessories for installation.

.2 Verify there is adequate supports and/or blocking in gypsum wall assemblies prior to installation of washroom accessories.

.3 Provide fastening and mounting kits for washroom accessories.

.4 Locate washroom accessories where indicated on Drawings and where directed by Consultant.

.5 Install washroom accessory fixtures, accessories, and items in accordance with manufacturer's instructions and CAN/CSA B651-M. Provide exposed tamper-proof screws of stainless steel to match units.

.6 Install washroom accessories plumb, level, and securely and rigidly anchored to substrate surfaces and framing. Adjust accessories for proper operation and verify mechanisms function smoothly.

.7 Install grab bars to withstand minimum 408 kg downward pull. Provide necessary reinforcements as required.

.8 Clean and polish exposed surfaces and fill accessories with necessary supplies prior to acceptance by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for mailboxes Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ANSI, H35.1M Alloy and Temper Designation Systems for Aluminum (Metric).

.2 ASTM B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.3 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

1.3 **DESIGN REQUIREMENTS**

.1 Design rear loading mail boxes to meet requirements of Canada Post.

.2 Individual mail box dimensions to be approximately 125 H X 160 W X 380 D.

1.4 **SUBMITTALS**

.1 Product data: Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10.

.2 Shop drawings: Submit shop drawings in accordance with Section 01 10 10 indicating elevations, sections, details, materials, dimensions, gauges, finishes and relationship to adjacent construction.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Templates: Provide all necessary templates and instructions where fastenings or anchors are to be built in by others.

.5 Closeout submittals:
- .1 Supply 2 keys for each mail box to Consultant.
- .2 Supply 2 master keys to Consultant.

2 Products

2.1 **ACCEPTABLE PRODUCTS AND MANUFACTURERS**

.1 ‘Model 1100-BL' by Canadian Mailbox Company.

.2 ‘Model 6500’ by Riopel Mailboxes.

2.2 **MATERIALS**

.1 Aluminum sheet: ASTM B209 and ANSI H35.1, aluminum alloy 6061 T6.

.2 Galvanized sheet steel: ASTM A653/A653M Grade A, ZF075 zinc coating.

.3 Hinges: Full door length, cadmium plated, continuous 180 degree hinge. 0.75 mm thick, 6 mm long knuckle, 2.25 mm diameter pin.

.4 Lock: 5 pin cylinder cam style.

.5 Number plates: Opaque plastic.

.6 Label Holders: 280 mm long X 12 mm wide

.7 Fasteners: Manufacturer’s standard non-corroding.

2.3 **FABRICATION**

.1 Fabricate Work in accordance with reviewed shop drawings.

.2 Fabricate Work free from defects impairing function, appearance, strength and durability.

.3 Doors: Stamped from 6 mm thick aluminum sheet in required dimensions to form front closures. Doors to receive number plate engraved with required numerals. Secure plats with 2 self tapping screws inside door.

.4 Frames: Stamped from 5 mm thick aluminum sheet.

.5 Boxes: 0.7 mm galvanized sheet steel, all welded construction.

.6 Fabricate individual mail boxes so that they are self stacking, easily assembled, secured to parent structure and bolted together.

2.4 **FINISHES**

.1 Aluminum: Polished horizontally with #80 fine grain finish and painted with a clear, transparent, backed lacquer.

.2 Steel sheet: Finished with baked enamel paint.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Install mail boxes plumb and true in accordance with reviewed shop drawings and manufacturer's written instructions.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for miscellaneous specialties Work in accordance with the Contract Documents.

1.2 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data for each Product specified in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings in accordance with Section 01 10 10 indicating elevations, sections, details, dimensions, materials, gauges, and finishes.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Closeout submittals: Submit cleaning and maintenance instructions for miscellaneous specialties for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10.

1.3 **DELIVERY, STORAGE, AND HANDLING**

.1 Package or crate, and brace products to prevent distortion in shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings.

2 Products

2.1 **MANUFACTURED UNITS**

.1 Janitor’s shelf with mop and broom holders and hooks:
- .1 #B-239 x 34 by Bobrick Washroom Equipment of Canada or approved alternative.
- .2 330 mm H by 205 mm deep. Shelf constructed of minimum 1.2 mm stainless steel, mop and broom holders to have spring loaded rubber cam to grip handles up to 30 mm in diameter, and stainless steel hooks positioned below shelf.

.3 Finish: Type 304 stainless steel with satin finish.

.2 Bicycle rack/mount:

.1 Bicycle wall mounting system constructed of minimum 16 gauge hot rolled steel with 19 mm steel rod sliding arm and locking pin to lock frame and front wheel to parking system.

.2 'Lock-Up' by BikeRack Manufacturing & Distributing Company or 'Bike-Up' by Bike-Up Bicycle Parking Systems.

.3 Install racks in accordance with reviewed shop drawings and manufacturer's instructions 535 mm to 610 mm o.c. from wall.

.3 Security Mirror: Tempered glass security mirror No. TO-14120 by Lab Safety Supply, or approved alternative; 20.6 mm thick X 660.4 mm diameter with a maximum viewing area of 6096 mm. Shatter-resistant strength, vinyl coated, aluminum lock frame edges.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Verify substrate surfaces are solid, free from surface water, dust, oil, grease, projections and other foreign matter detrimental to performance.

.2 Items to be built-in: Provide information and templates required for installation of work of this Section, and assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with products specified in this Section in order that they function as intended.

.3 Verify there is adequate supports and/or blocking in gypsum wall assemblies prior to installation of miscellaneous specialty items as required and janitors shelf.

3.3 **INSTALLATION**

.1 Install miscellaneous specialties level and securely and rigidly anchored to substrate in accordance with authorities having jurisdiction, reviewed shop drawings, and manufacturer's written instructions.

.2 After installation, adjust miscellaneous specialties in accordance with manufacturer's written instructions.

3.4 **CLEANING**

.1 Clean and polish exposed surfaces prior to acceptance by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for window washing systems Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ANSI, H35.1M Alloy and Temper Designation Systems for Aluminum (Metric).

.2 ASTM A276, Specification for Stainless and Heat-Resisting Steel Bars and Shapes.

.3 ASTM B221M, Specification for Aluminum-Alloy Extruded Bars, Rods, Wires, Shapes and Tubes.

.4 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.

.5 CAN/CSA G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 CAN/CSA S16.1-M, Limit States Design of Steel Structures.

.7 CSA S157-M, Strength Design in Aluminum.

.8 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.9 CSA W47.2-M, Certification of Companies for Fusion Welding of Aluminum.

.10 CSA W48.1-M, Carbon Steel Covered Electrodes for Shielded Metal Arc Welding.

.11 CSA W59-M, Welded Steel Construction (Metal Arc Welding).

.12 CAN/CSA W117.2-M, Safety in Welding, Cutting and Allied Processes.

.13 CAN/CSA-Z91-M, Safety Code for Window Cleaning.

1.3 **DESIGN REQUIREMENTS**

.1 Design window washing systems in accordance with the Occupational Health & Safety Act and Regulations for window cleaning; Ont. Reg. 527/88 and 714/82. These regulations shall take precedence over CAN/CSA-Z91-M. Comply with the “Guidelines for enforcing window washing cleaning regulations affecting anchorage for fall arrest systems and tie-backs for suspended equipment primary support lines” issued by the Ontario Ministry of Labour.

.2 Design window washing system in accordance with Occupational Health & Safety Act, CAN/CSA-Z91-M, and to withstand live, dead, seismic, imposed and other loads, and which meets proper and current window washing practices.

.3 Design structural members with 4:1 safety factor based on ultimate strength and normal operating conditions.

.4 Design window washing system to ensure building surfaces and finishes will not be marred or otherwise damaged during normal operation of equipment.

.5 Design all anchor components to provide an adequate attachment means suited to current window washing practices and compatible with industry standard equipment.

.6 As a minimum, design shall comply with CSA S16.1, CSA S136, and CAN3 S157-M.

1.4 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations, and trouble-shooting protocol.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Elevations, sections, details, materials, operating components, dimensions, gauges, finishes and relationship to adjacent construction.
  - .2 Complete layout and configuration of complete window washing system, including locations and all other components and accessories.
  - .3 Clearly indicate design and fabrication details, window drops, hardware and installation details.
  - .4 Include all necessary Restrictive and Non Restrictive Working Usage Notes and General Safety Notes.
  - .5 Complete engineering design data confirming that Products meet design criteria specified.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Reports/Certificates/letters:
- .1 Provide all necessary and required test reports and certificates to comply with the relevant codes and regulations of jurisdictional authorities.
- .2 Submit test data from an independent testing laboratory to show that all anchors which are to be used in this project meet the loading requirements of CAN/CSA-Z91-M. Anchors are to be tested to fracture by horizontal loading in any direction.
- .3 Submit inspection reports within 5 days of inspection.
- .4 Submit certified proof of product liability insurance.
- .5 Submit a letter from the Engineer certifying that window washing system meets the performance requirements of the Ministry of Labour.

.5 Closeout submittals:
- .1 Provide at each roof entrance a reduced plastic laminated as-built shop drawing showing anchor locations and details, in accordance with requirements of jurisdictional authorities. Drawings shall be metal framed with clear polycarbonate scratch resistant cover and securely screwed to wall.
- .2 Complete inspection log book, to certify window washing system is ready for use in accordance with requirements of jurisdictional authority and for yearly inspections.
- .3 Submit following for each Product incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10:
  - .1 Identification: Manufacturing name, type, year, serial number, number of units, capacity, and identification of related systems.
  - .2 Functional description detailing operation and control of components.
  - .3 Performance criteria and maintenance data.
  - .4 Operating instructions and precautions.
  - .5 Safety precautions.

1.5 QUALITY ASSURANCE

.1 Manufacturer's qualifications:
- .1 Execute work of this Section only by a Subcontractor specializing in the design, fabrication and installation of window washing systems and who is also known to have been responsible for satisfactory installations similar to that specified during a period of at least the immediate past five years.
- .2 Manufacturers shall carry specific liability insurance (products and completed operations insurance in the amount of $2,000,000.00). This insurance must cover the failure of equipment and anchors.

.2 Installers qualifications: Perform Work of this Section by a company that is employed by, and under direct supervision of component manufacturer and has a minimum of five years proven experience in the installation of window washing systems of a similar size and nature.

.3 Retain a Professional Engineer, licensed in Province of Ontario, with experience in window washing systems Work of comparable complexity and scope, to perform following services as part of Work of this Section:
- .1 Design of window washing system.
- .2 Review, stamp, and sign fabrication, shop drawings, and design calculations.
- .3 Conduct shop and on-site inspections, prepare and submit written inspection reports verifying that this part of Work is in accordance with Contract Documents and reviewed shop drawings.

.4 Execute welding by firms certified in accordance with CSA W47.1 Division 1 or 2.1 and CSA W47.2-M. Ensure welding operators are licensed per CSA W47.1 and CSA W47.2-M for types of welding required by Work.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Specified manufacturer's products of Pro-Bel Enterprises Limited; Thaler Industries Ltd.; or Ankor Engineering Systems Inc. establish minimum acceptable standards for work of this Section. Equipment of other manufacturers shall meet or exceed specified manufacturer's standard. Conform to the requirements for equivalent products specified in Division 1.

2.2 **MATERIALS**

.1 Structural shapes, plates, and similar items: CAN/CSA-G40.20/G40.21-M, Grade 350W.

.2 Aluminum: ASTM B221 and ANSI H35.1 AA6063 alloy, T6 temper.

.3 Stainless steel: ASTM A276, Type 304.

.4 Welding materials: CSA W48.1-M and CSA W59-M.

2.3 **FABRICATION**

.1 Verify dimensions of existing Work before commencing fabrications and report discrepancies to Consultant.

.2 Fabricate Work in accordance with reviewed shop drawings.

.3 Fabricate Work free from defects impairing function, strength and durability.

.4 Accurately cut, machine and fit joints, corners, copes and mitres so that junctions between components fit together tightly and in true planes. Cap open ends of sections exposed to view.

.5 Fabricate work with materials and component sizes, metal gauges, reinforcing, anchors, and fastenings of adequate strength to ensure that it will remain free of warping, buckling, opening of joints and seams, and distortion within limits of intended and specified use and with allowable design factors imposed by jurisdictional authorities.

.6 Weld all connections, unless otherwise indicated. Cleanly and smoothly finish exposed edges of materials including holes.

.7 Steel pipe uprights:
- .1 Fill steel pipe uprights with urethane foam insulation or other accepted filler.
- .2 Size uprights for a minimum 200 mm exposure above roof membrane in accordance with good roofing practices.

2.4 WELDING

.1 Perform welding by electric arc process.

.2 Execute welding to avoid damage or distortion to Work. Execute welding in accordance with following standards:
- .1 CSA W48.1-M - for Electrodes. If rods are used, only coated rods are allowed.
- .2 CSA W59-M and CSA W59S1-M for design of connections and workmanship.
- .3 CAN/CSA W117.2-M - for safety.

.3 Thoroughly clean welded joints and expose steel for a sufficient distance to perform welding operations. Finish welds smooth. Supply continuous and ground welds which will be exposed to view and finish painted.

.4 Test welds for conformance and remove Work not meeting specified standards and replace to Consultant's acceptance.

2.5 HOT DIP GALVANIZING

.1 After fabrication, hot dip galvanize steel items that will be exposed to the elements and as indicated. After galvanizing, plug relief vents air tight with appropriate aluminum plugs as suitable and required for intended metal fabricated item. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with zinc rich primer in accordance with manufacturer's printed directions.

.2 Hot-dip galvanize members in accordance with CAN/CSA G164-M and requirements of the following ASTM, with minimum coating weights or thicknesses as follows:
- .1 Rolled, pressed and forged steel shapes, plates, bars and strips: ASTM A123; average weight of zinc coating per square/metre of actual surface, for 4.8 mm and less thickness members 600 g/m^2 for 6 mm and heavier members 640 g/m^2.

.2 Iron and steel hardware: ASTM A153; minimum weight of zinc coating, in ounces per square foot of surface, in accordance with ASTM A153,Table 1 for the various classes of materials used in the Work.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Take site measurements of construction to which work of this Section must conform, and through which access must be made, before work is delivered to site, to ensure that adaptation is not required which would result in construction delay.

3.2 **INSTALLATION**

.1 Install work in accordance with reviewed shop drawings and manufacturer's recommended specifications, true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.

.2 Provide anchorage information, roughing-in dimensions, templates, and service requirements for installation of work of this Section, and assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with work specified in this Section in order that they function as intended.

.3 Assemble components delivered in sections. Use only fastenings suitable for materials.

.4 Work shall include rough hardware, fastenings, and other items necessary for secure installation.

.5 Install work straight, plumb, level, and secured to prevent distortion or displacement, or both.

.6 Secure components to building structure or construction as required to maintain it permanently in place, and so that it functions properly with no damaging vibration to the building or itself.

.7 Insulate between dissimilar metals, to prevent electrolysis.

3.3 **REPAIR**

.1 Refinish damaged or defective work so that no variation in surface appearance is discernible.

3.4 ADJUSTING AND FINAL INSPECTION

.1 Verify under work of this Section that installed products function properly, and adjust them accordingly to ensure satisfactory operation. Window cleaning roof anchors shall be inspected and tested by an independent inspection and testing body approved by jurisdictional authorities, before being used for the first time, independent and inspection and testing body shall fill out the log book in accordance with jurisdictional authority requirements.

.2 Complete the inspection log book to certify system for use.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for waste compactor and garbage chutes Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CSA C22.1, Canadian Electrical Code, Part 1, Safety Standards for Electrical Installations.

.2 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

.3 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.

.4 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.5 CSA W48.1-M, Carbon Steel Covered Electrodes for Shielded Metal Arc Welding.

.6 CSA W59-M, Welded Steel Construction (Metal Arc Welding).

.7 CAN/CSA W117.2-M, Safety in Welding, Cutting and Allied Processes.

.8 CGSB 1-GP-181, Organic Zinc Rich Primer.

1.3 **DESIGN REQUIREMENTS**

.1 Design waste compactor and chutes in accordance with the OBC and to withstand live, dead, seismic, handling, transportation, erection, all imposed loads and to accommodate the buildings expected waste capacity.

.2 Design chutes to accommodate requirements of fire regulations and authorities having jurisdiction in the place of the work.

.3 Design electrical equipment in accordance with CSA C22.1, and Ontario Hydro Electrical safety Codes.

.4 Design chute support structures to provide vibration isolation of frequencies above 16 Hz and to provide at least 20 dB vibration isolation at frequencies of 50 Hz and greater.

.5 Design connection between chute and garbage compactor with a flexible connection.

.6 Vibration/acoustic requirements:

.1 Provide rubber shock isolation liners at compactor deflector trays/hoppers and at baffles within sorters.

.2 Provide neoprene in-shear isolation mounts with minimum static deflection of 6 mm under supports for all hoppers and compactor frames; isolation mounts are to be captive-type to prevent any failure under lateral forces applied by compactor hydraulic ram.

.3 Provide neoprene in-shear isolation mounts with minimum static deflection of 6 mm under supports for compactor hydraulic motor/pump assembly; hydraulic lines are to be isolated using insulation sleeves at all points of attachment to structure.

1.4 SUBMITTALS

.1 Product data:

.1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:

.1 Performance criteria, compliance with appropriate reference standard(s), characteristics, limitations, and trouble-shooting protocol.

.2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:

.1 Submit shop drawings in accordance with Section 01 10 10 indicating:

.1 Elevations, sections, details, materials, operating components, dimensions, gauges, doors, finishes and relationship to adjacent construction.

.2 Complete electrical wiring diagrams including electrical schematics and sequence of operation.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.

.1 Indicate cost, post consumer and pre-consumer recycled content for each product.

.2 Identify each regionally extracted and manufactured material, its source and cost.

.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.4 Certificates: Submit certification from the manufacturer that the waste compactor and chutes conform this specification, fire regulations, and to authorities having jurisdictional.

.5 Closeout submittals:

.1 Submit operation and maintenance information for each component for incorporation into Operations and Maintenance Manuals in accordance with Section 01 10 10:

.1 Identification: Manufacturing name, type, year, serial number, capacity, and identification of related systems.

.2 Functional description detailing operation and control of components.

.3 Performance criteria and maintenance data.

.4 Operating instructions and precautions.

.5 Safety precautions.

1.5 **QUALITY ASSURANCE**

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience of a similar size and nature and that is approved by manufacturer.

.2 Retain a Professional Engineer, licensed in Province of Ontario, with experience in Work of comparable complexity and scope, to perform following services as part of Work of this Section:
.1 Design of garbage and recycling chutes.
.2 Review, stamp, and sign shop drawings.

.3 Execute welding by firms certified in accordance with CSA W47.1 Division 1 or 2.1. Ensure welding operators are licensed per CSA W47.1 for types of welding required by Work.

1.6 **MAINTENANCE**

.1 Provide a 12 month maintenance servicing and adjustment service, including 4 quarterly maintenance inspection, and establish a local spare parts and servicing agency. All lubricants, consumables, and replacement equipment shall be provided at no cost to Owner during maintenance period.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Specified manufacturer's products of Waste Solutions Group Inc., unless specified otherwise, establish minimum acceptable standards for work of this Section. Equipment of other manufacturers shall exceed specified manufacturer's standard.

2.2 **MATERIALS**

.1 Structural shapes, plates, and similar items: CAN/CSA-G40.20/G40.21-M, Grade 350W.

.2 Galvanized sheet steel: ASTM A653/A653M Grade A, Z275 Commercial Quality zinc coating, size and shape as shown.

.3 Welding materials: CSA W48.1-M and CSA W59-M.

.4 Fasteners: Conforming to ASTM A307, Grade A, hop dipped galvanized. Supply fasteners of lengths required to suit thickness of material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.

.5 Drilled inserts: Mega by ITW Construction Products or HSL by Hilti Inc. heavy-duty anchors, sizes as shown.

.6 Electrical equipment: To CSA C22.1, Ontario Hydro Safety Codes, and in accordance with requirements of Division 26.

.7 Vibration dampening compound: Vibration dampening compound to exterior of chute and equipment; 'V-DAMP 3680' by Daubert Chemical Company, 'DELTA-DB' by Thermatec Technologies or approved alternative.

.8 Insulation: 50 mm thick insulation with reinforced foil or vinyl face as recommended by chute manufacturer.

.9 Pipe insulation: 'Armaflex' pipe insulation sleeves by Armacell or approved alternative. Adhesive: Type as recommended by insulation manufacturer.

2.3 **EQUIPMENT**

.1 Garbage Chute: 600 mm diameter, garbage chute complete with accordion discharge by Waste Solutions Group Inc. or approved alternative having the following criteria:

.1 Chute fabricated from 1.2 mm thick steel.

.2 Intake Door: Stainless steel, 375 mm wide x 450 mm high, bottom hinged, hand operated self-closing positive latching doors bearing an appropriate ULC fire rating.

.3 Discharge: Type "AC" open end chute accordion style steel door with 74/C. fusible link to close automatically when the ambient temperature reaches 74/C. as required by authorities having jurisdiction.

.4 Vent: Chute shall extend full diameter through roof to metal top vent cap 1000 mm above roof level with counter flashing and insect screen.

.5 Accessories: IPS flushing spray head and 13 mm sprinkler head above highest intake. Additional 13 mm sprinkler heads at every second intake (counting from the top) or as required by authorities having jurisdiction.

.6 Provide disinfecting and sanitizing unit for installation in line to the flushing spray head. Connection to flushing spray head, back flow prevention valve and electric control switch by others.

.7 Provide 375 mm wide x 375 mm high right side hinged, hand operated, self closing, positive latching, fire rated plumbing access door for installation by forces erecting enclosing shaft wall. Door for access to disinfecting and sanitizing unit above the highest intake door of the chute.

.8 Sound isolator pads at each floor support frame.

.9 Sprinkler System: Chute shall be protected internally by automatic sprinklers, with a sprinkler at or above the top intake door of the chute, and a sprinkler installed within the chute at alternate floor levels.

.10 Garbage chute to be designed with tri-sorter option and diverting flaps for separation of organic and regular waste.

.2 Recycling chute: 600 mm diameter, single Recycling Chute by Waste Solutions Group Inc. or approved alternative for non-separated recyclable items.

.3 Waste Compactor:
- .1 Manual feed, fully automatic, push button controlled, stationary compactor, hydraulically operated, stationary ram compactor, displacing garbage into a heavy duty compaction container.
- .2 Equipped with side-inspection/receiving door to accept garbage bags, sized at 16" x 16".
- .3 Compactor body, top, sides and floor: Fabricated from 6.35 mm thick steel plate.
- .4 Ram face: Fabricated from 6.35 mm thick reinforced steel plate.
- .5 Hopper: Fabricated from 3.40 mm thick steel plate with 6.35 mm thick slope to take impact of falling refuse.
- .6 Cycle Time: 38 seconds.
- .7 Electrical: Automatic Electrical eye, On/off selector switch, "Full" indicator light.
- .8 Motor: 2 H.P.
- .9 Hydraulic: Ram force @ 800 psi = 5,500 kPa.
- .10 Finish: Shop finish inside and out with corrosion resistant paint.
- .11 Acceptable product: ‘WSG302MAN' by Waste Solutions Group Inc. or approved alternative.

2.4 FABRICATION

.1 Verify dimensions of existing Work before commencing fabrications and report discrepancies to Consultant.

.2 Fabricate Work in accordance with Contract Drawings and reviewed shop drawings.

.3 Fabricate Work free from defects impairing function, strength and durability. Conceal and weld connections wherever possible.

.4 Carefully make and fit details to prevent the collection of water in component voids. Cap open ends of sections exposed to view.

.5 Assemble chutes at the factory, ready for installation, weld vertical seams.

.6 Cleanly and smoothly finish exposed edges of materials including openings.

.7 Chute sections to be slip-jointed and provided with one expansion joint per story, without bolts, clips or rivets to mar the smooth interior surface. Crimped joints will not be accepted.

.8 Coordinate with and provide holes and connections for the work of Divisions 22 and 26.

.9 Top Cap to have a vent with an area not less than the cross sectional area of the Chute and covered by a Rain Cap. A flushing Spray Head with 19mm pipe adapter, to be located above top intake for wash down purposes.

2.5 **WELDING**

.1 Execute welding to avoid damage or distortion to Work. Execute welding in accordance with following standards:
- .1 CSA W48.1-M - for Electrodes. If rods are used, only coated rods are allowed.
- .2 CSA W59-M and CSA W59S1-M for design of connections and workmanship.
- .3 CAN/CSA W117.2-M - for safety.

.2 Thoroughly clean welded joints and expose steel for a sufficient distance to perform welding operations. Perform welding by electric arc process. Finish welds smooth. Supply continuous and ground welds. Touch-up welds with zinc rich primer.

.3 Test welds for conformance and remove Work not meeting specified standards and replace to Consultant's acceptance.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

.1 Provide anchorage information, rough-in dimensions, templets, and service requirements for installation work of this Section to other contractors. Assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with equipment specified in this Section.

.2 Fit joints and intersecting members accurately. Make Work in true planes with adequate fastenings. Build and erect Work plumb, true, square, straight, level and accurate to sizes detailed, free from distortion or defects detrimental to performance.

.3 Provide automatic sprinkler heads with 13mm pipe adapters located in the Intake Throats at alternate floor levels.

.4 Provide all rough hardware, fastening and other items necessary for a secure installation. Use only fastenings suitable for materials. Do not use through fasteners at roofs, floors, or walls.

.5 Secure fixed equipment to building as required to ensure that vibrations due to equipment operations are not transmitted to the building.

.6 Provision of plumbing and mechanical services and connections of equipment to these services to be in accordance with Division 22.

.7 Provision of electrical service and connections of equipment to the services to these services to be in accordance with Division 26.

.8 Apply an isolation coating to prevent corrosive or electrolytic action between dissimilar materials such as aluminum to concrete, masonry, galvanized steel and similar conditions.

3.3 ADJUSTMENT AND CLEANING

.1 Verify under the work of this Section that installed Products function properly, and adjust them accordingly to ensure satisfactory operation.

.2 Lubricate equipment in accordance with manufacturer's instructions.

3.4 DEMONSTRATION OF EQUIPMENT

.1 Demonstrate in the presence of the Consultant and Owner the operation of equipment following installation. Provide on-site instructions to the Owner in the operation and maintenance of the equipment.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment, tools, supervision, and services necessary for vibration control floating floor Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CSA O121-M, Douglas Fir Plywood.

.2 CAN/CSA O141, Softwood Lumber.

1.3 **DESIGN REQUIREMENTS**

.1 System Description: Unless specified otherwise, vibration control floating floor system shall be either formwork system as follows:

.1 Form work system: A form work floor system shall consist of a poured monolithic concrete floor complete with stiffeners, mounted on isolation pads with a layer of low density acoustically absorbent material in the cavity between the base and floating floor. Also provide perimeter isolation, temporary waterproofing, floor drains, reinforced concrete and perimeter caulking. Equipment may be supported by the floating floor (with appropriate vibration isolators supporting floor) or by vibration isolators and piers which penetrate the floor.

.2 Design vibration control floating floor to withstand live, dead, lateral, seismic, and other imposed loads. Be responsible for ascertaining all loads and characteristics of the supported structure affecting the isolation system.

.3 The floating floor shall be free from any rigid connections to any part of the building structure, and shall be designed to reduce the transmission of airborne and structure-borne sound from mechanical equipment spaces and other acoustically active areas to the rest of the building.

.4 Normal design load calculations shall be based on weight of floating floor plus weight of wall, equipment and fixtures supported by the floating floor system plus 25% of live load.

.5 Maximum design load calculations shall be based on weight of floating floor plus weight of wall, equipment and fixtures supported by the floating floor system plus 100% of live load.

.6 When a partition is supported on the edge of floating floor system, locate additional isolators and structural reinforcing as required, under floor edge.

.7 The dynamic natural frequency of the floating floor system shall not exceed 7 to 8 Hz or lower excluding the effects of the air cavity below the floating floor. The overall dynamic frequency of the floating floor system is not to exceed the natural frequency requirement of the isolators.

.8 Overload Capacity: Isolators and associated assemblies shall be capable of supporting minimum of four times normal design load without any visible damage, buckling or permanent set and shall remain totally functional when overload is removed.

.9 Design isolators for a minimum height of 50 mm of elastomeric material. In all cases the static deflection of isolators under maximum design load shall not exceed 15% of total thickness of elastomeric material in the isolator design. Provide for finished assembly to have 50 mm minimum, separation between floating floor and structural slab edge, which includes 38 mm of semi-rigid fibreglass insulation and is to fill the cavity under the floor a minimum of 75%.

.10 Static deflection of isolators under normal design load shall be uniform within 0.50 mm over entire floating floor area.

1.4 **SUBMITTALS**

.1 Product data:
- .1 Submit manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Sequence of concrete pours, layout of isolators, isolator type designations, design loading and static deflection for each floating floor area, forms, dimensions, gauges, and floor finishing.
  - .2 Indicate materials being supplied and complete design and construction details including, reinforcing bar layout, sealant joint design, details of all penetrations and other item that will affect coordination and installation of floating floor system.
  - .3 Submit details of junctions between floating floor and perimeter walls, columns, housekeeping pads, floor drains, pipe penetrations, and other perimeter conditions.
  - .4 Submit complete engineering design data to confirm that floating floor system meet design requirements specified.

.3 Samples: Submit samples of each type of material to be used for the work of this Section in accordance with Section 01 10 10.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.5 Reports: Submit written field inspection and test report results after each inspection in accordance with Section 01 10 10.

1.5 **QUALITY ASSURANCE**

.1 Single source responsibility:
- .1 It is the intent of this Section to establish a single, competent source responsible for the complete floating floor system which includes the following:
  - .1 Cast-in place concrete in accordance with Division 3.
  - .2 Isolation system as specified herein.
- .2 As typical in a single source concept, the satisfactory provision of concrete work shall be part of this Section's responsibility, even though it is supplied and placed by Division 3. Therefore, any defects in the concrete will be traced back to this Section.

.2 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in installations of similar size and nature.

.3 Retain a Professional Engineer, licensed in Province of Ontario, with experience in Work of comparable complexity and scope, to perform following services as part of Work of this Section:
- .1 Design of vibration control floating floor system.
- .2 Review, stamp, and sign shop drawings, design calculations.
- .3 Conduct site inspections, prepare and submit written inspection reports verifying that this part of Work is in accordance with Contract Documents and reviewed shop drawings.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Vibration control floating floor systems shall be provided by one of the following:
- .1 CDMca Limited.
- .2 Mason Industries Inc.
- .3 Vibro-Acoustics.

2.2 **MATERIALS**

.1 General:
- .1 All materials under Work of this Section, including but not limited to, sealants and grouts are to have low VOC content limits.
- .2 All dimensional lumber and plywood used to be FSC certified.
- .3 Material to be sourced regionally from within 800 km of jobsite wherever possible.

.2 Isolation Materials: Neoprene, EAFM, or CDM pads.

.3 Wood blocking and backing: Construction or better grade, G2S, kiln dried with moisture content 19% or less, free from sap, shakes, splits, knots and other defects and in accordance with CSA O141 and NLGA, Standard Grading Rules for Canadian Lumber.

.4 Plywood: CSA O121-M, G1S standard construction, laminated with waterproof adhesive, exterior grade.

.5 Perimeter isolation board: 50 mm thick semi-rigid fibreglass insulation, moisture-resistant, minimum density 80 kg/m^3. Type as recommended by vibration control floating floor manufacturer and approved by the Consultant.

.6 Floor cavity insulation: 38 mm thick semi-rigid fibreglass insulation, moisture-resistant, friction fit, minimum density 80 kg/m^3. Type as recommended by vibration control floating floor manufacturer and approved by the Consultant.

.7 Acoustic Sealant: In accordance with Section 09 21 16.

.8 Concrete: In accordance with Division 3.

.9 Grout: Pre-mixed, flowable, non-shrink grout without aggregate fillers; Masterflow 713 Plus by BASF; SikaGrout 212 HP by Sika Canada Inc.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Verify substrate surfaces are solid, free from surface water, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to performance.

.2 Broom clean and remove debris from substrate surfaces, blow substrate surfaces clean using oil-free compressed air.

.3 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from Work of this Section.

.4 Ensure that sound isolation material is not disturbed or damaged during placing of formwork or concrete.

.5 Ensure that waterproofing membrane is not disturbed or damaged during placing of sound isolation modules.

3.3 **INSTALLATION**

.1 Install floating floor system in accordance with reviewed shop drawings and manufacturer's written instructions.

.2 The floating floor system manufacturer shall be responsible for the coordination and overseeing all work performed under this Section including installation of any penetrations in the floating slab by other Divisions.

.3 Place sound isolation modules and other components of the system as indicated on reviewed shop drawings. Apply perimeter isolation materials to walls, columns, bases, and other penetrating structural components with adhesive.

.4 Install perimeter isolation material to a height above the poured concrete height at all points. Take care to avoid damaging the perimeter isolation.

.5 Install formwork on top of isolation modules and against perimeter isolation material. Care shall be taken not to damage isolation modules, nor to displace isolation material from their proper location during this process.

.6 Formwork to be waterproofed prior to placing reinforcing steel by sealing and supplemental taping of all joints and around penetrations, to prevent leakage of water or grout from forms during placing of concrete.

.7 Install reinforcing steel and concrete in accordance with Division 3.

.8 After concrete has cured, cut back perimeter isolation board where necessary and apply sealant in accordance with Section 09 21 16 to achieve air-tightness.

.9 Provide adequate protection during construction to avoid damage to finished floating slab system.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for earthwork Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.

.2 ASTM D4253, Test Method for Maximum Index Density and Unit Weight of Soil Using a Vibratory Table.

.3 OPSS, Ontario Provincial Standard Specification.

1.3 **SUBMITTALS**

.1 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.2 Reports:
- .1 Submit written laboratory test reports.
- .2 Submit written field inspection and test report results after each inspection.

.3 Submit dewatering methods 30 days in advance for review by Consultant. If well point system is required, Engineer shall design system and supervise installation.

.4 Submit to Consultant details of locations where surplus soils and other materials are to be disposed of or reused. Include each disposal/reuse Site and type of surplus soil or other material, location of the disposal/reuse Site, operator's name and business address, type of license under which Site operates, and criteria used by Site to access suitability of surplus material for disposal.

.5 Submit to Consultant, within 48 hours of a load of surplus soil or other material leaving the Site, a daily register recording the time and place of disposal/reuse of each load signed by a representative of the disposal site. Such documentation must be submitted before payment for excavation will be made.

1.4 **QUALITY ASSURANCE**

.1 Have shop drawings signed and sealed by a Professional Engineer licensed in Province of Ontario and having experience in design and inspection of shoring, bracing, underpinning and dewatering (if required) required to complete Work.

1.5 **SITE CONDITIONS**

.1 Geotechnical conditions: For information on subsurface conditions refer to document appended to Section 02 32 00.

.2 Cultural heritage resources: If Cultural Heritage Resources (such as archaeological sites, artifacts, building and structural remains, and/or human burials) are encountered during performance of Work, contact Consultant immediately and suspend Work in immediate area until assessment has been completed by Ministry of Culture, Tourism and Recreation. Perform required measures to mitigate negative impacts on found resources to acceptance of Consultant.

1.6 **PROTECTION**

.1 Existing buried utilities and structures:
- .1 Size, depth and location of known existing utilities and structures are indicated for guidance only. Completeness and accuracy is not guaranteed.
- .2 Prior to commencing any excavation Work, have authorities stake out utility locations to prevent disturbance during Work.
- .3 Confirm locations of buried utilities by careful test excavations. Hand dig test excavations as necessary.
- .4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered. Obtain permission of Consultant before moving or otherwise disturbing utilities or structures.

.2 Existing buildings and surface features:
- .1 Conduct with Consultant, a condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by Work.
- .2 Protect existing buildings and surface features which may be affected by Work from damage while Work is in progress and repair damage resulting from Work.
- .3 Where excavation necessitates root or branch cutting, perform Work in accordance with Authorities having Jurisdiction.
- .4 Confirm with Consultant, condition Survey of buildings and structures undertaken by Consultant.

.3 Temporarily cover local existing catch basins and maintenance holes to prevent entry of earth or debris. Ensure adequate surface drainage in affected area is maintained.

.4 Protect Work or work of other Contracts in progress or completed and protect existing properties, stored Products, services, utilities, trees, landscaping and natural features from damage.

.5 Protect excavations against flooding and damage and install and maintain appropriate warning devices during construction and during time when Work is closed down for any cause.

.6 Protect bottom of excavations that will support foundations, slabs, pavements etc. from frost or freezing.

.7 Keep access roads clear of debris and dirt resulting from Work of this Section to acceptance of Authorities having jurisdiction.

.8 Shoring, bracing and underpinning: Comply with local regulations, authorities having jurisdictions and requirements specified.

2 Products

2.1 **MATERIALS**

.1 Select fill: Subject to approval of Consultant consisting of reusable fill excavated from Site or imported fill that is free of organic matter, rubble and material other than soil. Maximum particle size of half thickness of lift specified, moisture content at time of placing 2% maximum over its optimum moisture content and is either non plastic or has a plasticity index of 25% maximum.

.2 Granular A fill: Imported Granular A fill, free of organic matter and, in accordance with OPSS 1010.

.3 Granular B Fill: Imported Granular B fill free of organic matter and in accordance with OPSS 1010.

.4 Granular D fill: In accordance with OPSS-1004, containing 100% crushed aggregates, free of organic matter.

.5 Clear Stone fill: 19 mm clear stone in accordance with OPSS 1004, free of organic material.

.6 Unshrinkable fill: 0.7 MPa cement stabilized backfill conforming to requirements of CAN/CSA A23.1/A23.2-M.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **LINES AND ELEVATIONS**

.1 Establish lines and elevations from Control Points shown on Contract Drawings.

.2 Have lines and elevations established by Registered Ontario Land Surveyor or qualified Civil Engineer registered in Province of Ontario.

.3 Protect and maintain Control Points and Bench Marks as long as they are required.

3.3 **STRIPPING**

.1 Do not handle topsoil while in wet or frozen condition or in manner in which soil composition is adversely affected.

.2 Strip topsoil from working area in locations shown.

.3 Strip topsoil to depths indicated. Avoid mixing topsoil with subsoil.

.4 Stockpile topsoil in locations directed by Consultant. Stockpile to height not exceeding 2 m.

3.4 **REMOVAL OF WATER**

.1 Obtain letter of conditional approval from Metropolitan Toronto Works Department to dispose of ground water into sewer drainage system. Apply for and pay for water disposal permit.

.2 Keep excavations and trenches free of water throughout construction period.

.3 Groundwater removal:
- .1 Lower groundwater level and maintain at depth below lowest point of excavation to ensure a dry stable surface.
- .2 Dewater to prevent loss of soil and maintain stability of sides and bottom of excavation and of adjacent structures.

.3 Dispose of water in conformance with applicable by-laws and in a manner not detrimental to public and private property, or portion of Work completed or under construction.

.4 Supply and install flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to sewers, water courses or drainage areas in accordance with authorities having jurisdiction. Perform testing on settlement tank discharge to confirm that effluent meets sewer bylaw requirements. Locate tanks to acceptable area determined by Consultant.

.5 Should method of dewatering fail to achieve conditions specified above, Consultant reserves right to revise methods and procedures at no cost to Owner.

.4 Surface water removal:

.1 Remove surface run-off in a manner that will prevent loss of soil and maintain stability of sides and bottom of excavation. Obtain Consultant's approval of dewatering method to be used.

.2 Discharge surface water into existing storm drainage system to acceptance of Consultant and local authorities.

.5 Do not obstruct flow of surface drainage or natural water courses.

3.5 **EXCAVATION**

.1 Remove concrete, masonry, paving, demolished foundations and rubble and other obstructions encountered during excavation Work.

.2 Do not disturb soil within drip line of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw in a manner acceptable to authorities having jurisdiction.

.3 Excavate to required lines and grades shown on Contract Drawings with allowance for subsequent Work including shoring, bracing and formwork. Make excavation clean and clear of loose material and true to size.

.4 Protect stockpiles of fill against contamination and moisture absorption.

.5 Do not undermine adjacent structures. Where it is necessary to have footings at different levels, found upper footing below imaginary 10-horizontal-to-7 vertical line, or as otherwise indicated, drawn up from base of lower footing. Protect adjacent foundations from frost.

.6 Have excavations in excess of 1200 mm in depth conform to requirements of Occupational Health and Safety Act, and Regulations for Construction Projects.

.7 Do not expose shale at subgrade elevation to drying cycles and in any case, following inspection, cover with minimum 50 mm of lean concrete within 4 hours after exposure.

.8 Fill excavations for foundations which are, through error, carried below elevation shown or approved depth, with 15 MPa concrete, or as directed by Consultant.

.9 Trim, and remove loose material, debris and organic material from excavations. Where material at bottom of excavation is disturbed, remove disturbed material and re-compact to density equal to or better than undisturbed soil or backfill with lean concrete as directed by Consultant.

.10 When excavations are complete, prior to commencement of subsequent Work, request Consultant for inspection of excavation Work.

3.6 **TRENCHING**

.1 Excavate trenches to lines and grades indicated and to a depth of 75 mm minimum below invert elevation and slope established for pipe, and backfill to invert elevation of pipe with specified granular material.

.2 Unless otherwise authorized by Consultant, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation. Remove unsuitable material from trench bottom to extent and depth as directed by Consultant.

.3 Backfill Over-excavation with granular material and compact.

.4 If unstable soil conditions are encountered, excavate trenches to depth directed by Consultant and backfill to correct elevation with backfill material.

.5 Remove loose material from bottom of trenches to ensure granular material is placed against undisturbed soil.

.6 Compact bedding and grade as required for even and uniform support on each length of pipe.

.7 Where excavating is required adjacent to and parallel with and below any footing, submit excavation and backfill procedures to Consultant for review prior to start of excavating.

.8 Keep width of trenches to a minimum to ensure minimum span for pipe to be supported.

.9 Make excavations for fire hydrants of sufficient size and depth to accommodate a minimum 0.75 m^3 of crushed stone. Hand place stone and tamp around and below hydrant elbow to ensure proper drainage of hydrant.

3.7 **EXCAVATED MATERIAL DISPOSAL**

.1 Except for material to be used as select fill, immediately remove and dispose of excavated material from Site.

.2 Remove and dispose of construction rubble, abandoned gas, water and sewer pipes, valves, valve boxes and fittings, maintenance holes, frames and covers and other material which may be encountered during excavation but not indicated on Contract Drawings.

3.8 **BACKFILLING**

.1 Do not proceed with backfilling operations until walls, slabs, waterproofing and below grade Work has been inspected and accepted by Consultant.

.2 Backfill areas which are free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Do not backfill on or against any membrane or protection board covered waterproofing with jagged rock or other sharp objects which might damage waterproofing.

.5 Limit vertical drop of backfill material to 2000 mm.

.6 To avoid pockets and voids, remove sheathing and shoring materials that require removal, as backfilling progresses.

.7 Prior to backfilling or placing concrete on exposed soil subgrade, proof roll subgrade to identify soft or loose areas. Proceed with placing backfill or concrete only after inconsistencies identified by above procedure have been reworked and compacted or excavated, backfilled and compacted as required to eliminate such conditions to acceptance of Consultant.

.8 Place backfill material, grade and compact to levels shown on Contract Drawings.

.9 Place backfill materials in uniform layers 200 mm maximum loose thickness unless specified otherwise.

.10 Ensure each layer is compacted, and accepted by Consultant, before placing succeeding layers.

.11 Unless otherwise indicated, use specified granular material from bottom of trench to 300 mm above top of pipe or 150 mm above top of electrical conduits. Hand place in 150 mm layers and compact carefully to ensure proper backfilling and compaction around bottom quadrants and sides of pipe.

.12 For backfill from 300 mm above top of pipe or 150 mm above electrical conduits to sub-grade level, use select fill unless otherwise noted. Compact either by hand or by machine.

.13 Do not backfill trenches until piping, conduits and cables therein have been inspected, tested, and approved by inspection authorities having jurisdiction and Consultant.

.14 Prior to backfilling of trenches, remove wood block or wedges used to prevent movement of piping during tests.

.15 Where there is a common boundary between select fill and granular fill or unshrinkable fill, place select fill after granular fill has been compacted. Place and compact fill around free standing structures evenly on all sides of structure simultaneously in layers sloping away from structure.

.16 During backfilling, take care to avoid displacing or damaging Utilities Work and Services.

.17 Notify Consultant prior to commencement of backfilling and compacting operations.

3.9 **COMPACTION**

.1 Compaction densities for select fill, granular fill, and sand fill materials will be determined by ASTM D698. Compaction densities for clear stone and pea gravel will be determined by ASTM D4253.

.2 Add water if necessary to obtain required densities. Correct irregularities or depressions that may develop during compaction by removing or adding material to form a smooth and uniform surface.

.3 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.4 If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.

.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers acceptable to Consultant.

.6 Compact backfill materials in accordance with Geotechnical Report providing the following as a minimum:
- .1 Imported fill: 98% standard Proctor maximum dry density (SPMDD).
- .2 Under slabs, walks and pavements: 100% (SPMDD).
- .3 All other areas: 95% (SPMDD).

3.10 **GRADING**

.1 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.2 Place material only on clean unfrozen surface, properly shaped and compacted and free from snow and ice. Ensure no frozen material is used in placing.

.3 Grade as necessary to bring Work areas to required elevations. Supply additional material required to obtain new grade levels. Place and compact as specified.

.4 Grade drainage ditches to elevations indicated on Contract Drawings.

.5 Maintain positive drainage.

.6 Grade materials using methods which do not lead to segregation or degradation of aggregate.

.7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.8 Remove and replace that portion of layer in which material becomes segregated during spreading.

.9 Slope grade away from buildings 1:50 minimum.

.10 Make graded areas smooth to profile, free of debris, with local excavations and depressions filled and compacted.

.11 Do not disturb soil within branch spread of trees and shrubs remaining.

.12 Cultivate entire area which is to receive topsoil to a depth of 100 mm. Repeat cultivation in those areas where equipment used for hauling and spreading has compacted soil.

.13 Remove surface debris, roots, vegetation, branches and stones in excess of 50 mm in diameter.

3.11 **FINISH GRADING**

.1 Fine grade and loosen topsoil. Eliminate rough spots and low areas to ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Roll to consolidate topsoil for areas to be seeded or sodded leaving surface smooth, uniform, firm against deep foot printing, and with fine loose texture to approval of Consultant.

3.12 **UNSHRINKABLE FILL**

.1 Place unshrinkable fill in locations indicated on Contract Drawings or where Work area is too limited to permit proper placing and compaction. Obtain Consultants approval prior to placing unshrinkable fill. Place in accordance with supplier's written instructions.

.2 If embedded items occur in area being backfilled, coordinate with appropriate trades to ensure that disturbance of embedded items during backfilling is prevented.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment, tools, and services necessary for asphaltic concrete paving Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.

.2 ASTM D1559, Test Method for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

.3 OPSS, Ontario Provincial Standard Specification.

1.3 **SUBMITTALS**

.1 Shop drawings: Submit shop drawings in accordance with Section 01 10 10 indicating sections, materials, dimensions, and relation to adjacent construction.

.2 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

.3 Reports:
- .1 Submit written mix designs for each type of asphalt concrete for acceptance.
- .2 8 weeks prior to commencing Work test materials for conformance with requirements of Specifications. Submit written test report verifying compliance 4 weeks minimum prior to commencing Work.
- .3 Submit written field inspection and test reports.
- .4 Submit certification that testing laboratory is accredited for asphalt mix design through the Canadian Council of Independent Laboratories (CCIL).

1.4 **QUALITY ASSURANCE**

.1 Pre-installation meetings: Arrange with Contractor, asphalt Subcontractor, and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

1.5 **SITE CONDITIONS**

.1 Do not install Work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
- .1 Air and surface temperature: OPSS 310.
- .2 Precipitation: None within 24 hours prior to placement.

1.6 **EXTENDED WARRANTY**

.1 Submit a extended warranty for Work of this Section in accordance with General Conditions, except that warranty period is extended to two years.

2 Products

2.1 **MATERIALS**

.1 Granular base and sub-base material: Granular "A" OPSS 1010, crushed or screened stone or gravel.

.2 Asphalt materials:
- .1 Hot mixed, hot laid asphalt meeting OPSS 1150, designation H.L. 8 for binder course and H.L. 3 for surface course.
- .2 Tack and primer coat: OPSS 1103 Grade SS-1.

.3 Traffic paint: In accordance with Section 32 17 23 - Painted Traffic Lines.

2.2 **MIXES**

.1 Mix asphalt materials in accordance with OPSS 1003 for H.L. 8 and H.L. 3.

.2 Do not change mix without prior approval of Consultant.

2.3 **SOURCE QUALITY CONTROL**

.1 Source approval:
- .1 Inform Consultant of proposed source of Products and afford access for sampling and testing of quality of Products at least 4 weeks prior to commencing production.
- .2 Ensure that source of Products to be incorporated into Work or stockpiled is acceptable to Consultant.
- .3 Submit laboratory test results for samples of specified Products to be supplied by this Section. Include in laboratory test results those tests required to demonstrate that Product meets requirements of this Section.
- .4 If Products from proposed source do not meet, or cannot reasonably be processed to meet specified requirements, locate an alternative source or demonstrate that Products source in questions can be processed to meet specified requirements.

.5 Should a change of Products source be proposed during Work, advise Consultant 14 days in advance of proposed change to allow sampling and testing.

.6 Acceptance of Product at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unacceptable. Remove and dispose rejected material.

.2 Production sampling:

.1 Products may be subject to continual sampling by Consultant during production.

.2 Afford Consultant ready access to source and processed Products for sampling and testing.

.3 If Products fail to meet Specifications, bear cost of additional sampling and testing of aggregates and fill.

.4 Supply necessary personnel and equipment to permit adequate investigation and sampling. Advise Consultant at least 14 days in advance of use of Products, to allow sufficient time for sampling and testing.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Verify grades of items set in paving area for conformity with elevations and sections before placing granular base and subbase material.

.2 Obtain approval of subgrade by Consultant before placing granular subbase and base.

.3 Coordinate elevations of maintenance holes and other appurtenances and make flush with top of finish asphalt concrete paving.

3.3 **SUBBASE AND BASE**

.1 Comply with OPSS 314.

.2 Prior to placing subbase and base proof roll subgrade to identify soft spots. Excavate soft spots and backfill with granular material to 100% standard Proctor maximum dry density in accordance with ASTM D698.

.3 Place granular base and subbase material on clean unfrozen surface, free from snow and ice.

.4 Place granular base and subbase to compacted thicknesses as indicated. Do not place frozen material.

.5 Place in layers not exceeding 150 mm compacted thickness. Compact to density not less than 100 % standard Proctor maximum dry density in accordance with ASTM D698.

.6 Finished base surface to be within 5 mm of specified grade, but not uniformly high or low.

3.4 **ASPHALT PRIMER**

.1 Apply primer coat in accordance with OPSS 302.

.2 Do not apply primer when air temperature is less than 5°C or when rain is forecast within 2 hours.

.3 If asphalt primer fails to cure within 24 hours, spread sand blotter material in amounts required to absorb excess material. Sweep and remove excess blotter material.

3.5 **EQUIPMENT**

.1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.

.2 Rollers: sufficient number of rollers of type and weight to obtain specified density of compacted mix.

.3 Vibratory rollers:
.1 Minimum drum diameter: 750 mm.
.2 Maximum amplitude of vibration (machine setting): 0.5 mm for lifts less than 40 mm thick.

.4 Haul trucks: of sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows.

.5 Suitable hand tools.

3.6 **ASPHALT PAVING**

.1 Comply with requirements of OPSS 310.

.2 Obtain approval of tack coat base and primer from Consultant before placing asphalt mix.

.3 Place asphalt mix only when base or previous course is dry and air temperature is above 5°C.

.4 Place asphalt concrete in compacted layers not exceeding 50 mm per lift.

.5 Minimum 135°C mix temperature required when spreading.

.6 Maximum 160°C mix temperature permitted at any time.

.7 Compact each course with roller as soon as it can support roller weight without undue cracking or displacement.

.8 Compact paving to density not less than 97% of density obtained with Marshall specimens prepared in accordance with ASTM D1559. Roll until roller marks are eliminated.

.9 Keep roller speed slow enough to avoid mix displacement and do not stop roller on fresh pavement.

.10 Moisten roller wheels with water to prevent pick up of material.

.11 Compact mix with hot tampers or other equipment approved by Consultant, in areas inaccessible to roller.

.12 Finish surface to be within 5 mm of design elevation and with no irregularities greater than 10 mm in 4.5 m.

.13 Repair areas showing checking, rippling or segregation as directed by Consultant.

3.7 **JOINTS**

.1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.

.2 Paint contact surfaces of existing structures such as catchbasins, manholes, curbs or gutters with tack coat prior to placing adjacent pavement.

.3 For cold joints, cut back to full depth vertical face and tack face with hot asphalt.

.4 For longitudinal joints, overlap previously laid strip with spreader by 25 to 50 mm.

3.8 **FIELD QUALITY CONTROL**

.1 Conduct following field tests, submit report to Consultant:
- .1 Granular materials for composition and gradation.
- .2 Granular material and asphalt concrete compaction.

3.9 **PROTECTION**

.1 Keep vehicular traffic off newly paved areas until paving surface temperature has cooled below 38°C. Do not permit stationary loads on pavement until 24 hours after placement.

3.10 **SCHEDULE**

.1 Refer to Geotechnical Report for compacted thicknesses of pavement structures for asphaltic concrete paving, unless otherwise indicated.

.2 Paving on public property, meet requirements of municipality.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for concrete curbs and pavements Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A185/A185-M, Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.2 ASTM C260, Specification For Air-Entraining Admixtures For Concrete.

.3 ASTM C309, Specification For Membrane-Forming Compounds for Curing Concrete.

.4 ASTM C494/C494-M, Specification For Chemical Admixtures For Concrete.

.5 ASTM D994, Specification For Preformed Expansion Joint Filler For Concrete (Bituminous Type).

.6 CAN/CSA A23.1/A23.2-M, Concrete Materials and Methods of Concrete Construction/Methods of Tests For Concrete.

.7 CAN/CSA A3000, Cementitious Materials Compendium.

.8 CAN/CSA G30.18-M, Billet-Steel Bars for Concrete Reinforcement.

.9 CSA O121, Douglas Fir Plywood.

.10 CAN/CSA S269.3-M, Concrete Formwork.

1.3 **DESIGN REQUIREMENTS**

.1 Concrete: 30 Mpa unless otherwise indicated on drawings. Exterior concrete to have 5-7% entrained air.

.2 Design concrete so that material will not segregate and excessive bleeding will not occur.

.3 Comply to the MTC Manual of Uniform Traffic Control Devices for signs and flagging when working within existing road ways. Any requirements to restrict local traffic due to the contractors works, must be reviewed and approved by the Consultant.

1.4 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 10 10 for each material indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), and characteristics.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings in accordance with Section 01 10 10 indicating elevations, sections, details, materials, joint assemblies, finishes and relationships to adjacent construction.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.5 **QUALITY ASSURANCE**

.1 Inspection and testing:
- .1 Materials: CAN/CSA A23.1/A23.2-M; Inspect and test for conformance to requirements of this Standard and to Specifications.
- .2 Tests will be made in accordance with CAN/CSA A23.2-M.
- .3 Remove defective materials and completed Work which do not conform to the Contract Documents.

1.6 **DELIVERY, STORAGE, AND HANDLING**

.1 Deliver and store materials on Site in accordance with CAN/CSA A23.1/A23.2-M.

1.7 **SITE CONDITIONS**

.1 Conform to CAN/CSA A23.1/A23.2-M.

.2 Do not deposit concrete on frozen ground. When deposited in forms concrete shall have a temperature between 10°C and 30°C and these limits shall be maintained for 72 hours.

2 Products

2.1 **MATERIALS**

.1 Forms: Plywood to CSA O121, G1S; Douglas Fir plywood, seven ply, exterior grade, waterproof glue, edges sealed with oil based sealer.

.2 Form ties: Adjustable snap ties, formed to break 25 mm or more from surface of concrete after form removal, with a minimum working strength of 1360 kg.

.3 Form release agent: Chemically active, non-staining, VOC compliant, release agents containing compounds that react with free lime present in concrete forming water insoluble soaps, preventing concrete from sticking to forms.

.4 Reinforcing steel: CAN/CSA G30.18-M; Billet-steel bars, deformed unless indicated otherwise, Grade 400R.

.5 Welded steel wire fabric: ASTM A185/A185-M; Resistance welded in size and spacing shown for smooth wire fabric, in flat sheets only.

.6 Chairs, bolsters, supports, spacers: CAN/CSA A23.1-M with sufficient strength to rigidly support weight of reinforcement and construction loads. Manufactured by NCA/Acrow - Richmond or Dayton Superior.

.7 Cement: CAN/CSA A3000; Portland, Type 10.

.8 Coarse and fine aggregate: CAN/CSA A23.1/A23.2-M.

.9 Water: CAN/CSA A23.1/A23.2-M.

.10 Water reducing admixture: ASTM C494/C494-M, Type A.

.11 Set retarding admixture: ASTM C494/C494-M, Type D.

.12 Air entraining admixture: CAN/CSA A23.1/A23.2-M and ASTM C260.

.13 Pigmented curing compound: ASTM C309, Type 2, Class B; White pigmented resin based.

.14 Joint filler: ASTM D994, Asphalt impregnated; ‘Asphalt Joint Expansion Joint Filler’ by W. R. Meadows Ltd., in thickness shown on Contract Drawings. Furnish kraft paper or polyethylene sheet as bond breaker between sealant and joint filler

.15 Joint Sealant: Two component, non-tracking, chemically reactive urethane/coal tar modified sealant; ‘Sealtight Gardox’ by W. R. Meadows Ltd. or ‘Vulkem 202' by Tremco.

.16 Bonding Agent: Furnish ‘Sika-Dur’ by Sika, or ‘Intralock’ by W. R. Meadows.

2.2 **MIXES**

.1 Acceptance of any concrete mix proportion or material, does not preclude its future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unacceptable.

.2 Mix concrete and concrete proportions in accordance with CAN/CSA A23.1/A23.2-M.

2.3 **ADMIXTURES**

.1 Use admixtures for concrete from single manufacturer, unless otherwise acceptable to Consultant.

.2 Have manufacturer certify that admixtures are compatible.

.3 Add admixtures to concrete mix in accordance with manufacturer's recommendations.

.4 Except as specified otherwise, comply with requirements of CAN/CSA A23.1/A23.2-M.

.5 Use of calcium chloride or additional admixtures, other than those specified, is not acceptable.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **GENERAL**

.1 Give Consultant at least 2 working days notice prior to placement of concrete to permit a review of compaction, placement of formwork, reinforcing steel, and associated items embedded in concrete for conformance to reviewed shop drawings and Contract Documents.

.2 Do not place concrete on surfaces which contain frost, water or debris.

.3 Provide concrete curb cuts and sidewalk handicap access ramps as indicated, in accordance with the authorities having jurisdiction.

3.3 **PREPARATION**

.1 Verify grades of items set in paving area for conformity with elevations and sections before placing granular base and subbase material.

.2 Obtain approval of subgrade by Consultant before placing granular subbase and base.

.3 Set out work from lines and levels shown on drawings.

.4 Prevent damage to adjacent and/or existing buildings and/or properties, and existing curbs, sidewalks and asphalt paving.

.5 Accurately saw-cut and modify existing sidewalks to nearest adjacent dummy/expansion joint as directed on site by Consultant.

.6 Remove and dispose of debris from the work of this section in accordance with authorities having jurisdiction.

.7 Fine grade, shape and compact subgrade to minimum of 95% Standard Proctor Density.

.8 Wet base immediately in advance of concreting to ensure a firm moist surface without ponding.

.9 Repair damage to base resulting from hauling or equipment operations.

3.4 **FORMWORK**

.1 Construct formwork in accordance with CAN/CSA S269.3-M to produce finished concrete conforming to shape, dimensions, locations and elevations indicated. Ensure no lumber remains in concrete.

.2 Set forms true to line and grade, join neatly and tightly, and stake securely to resist concrete pressure and impact from tampers without springing.

.3 Apply release agent by spray in accordance with manufacturer's recommendations. Ensure form surfaces receive a uniform coating.

3.5 **REINFORCING**

.1 Place reinforcing steel as shown on reviewed shop drawings and in accordance with CAN/CSA A23.1-M. Make bars as long as possible.

.2 Make splices in locations shown on Drawings. Lap lengths in accordance with CSA A23.3 unless otherwise shown.

.3 Lap ends and sides of wire fabric not less than 150 mm.

3.6 **PLACING OF CONCRETE**

.1 Before placing fresh concrete against set or partially set concrete, clean surfaces to remove dirt, scum, shavings, debris, laitance, etc. on set surfaces, brush generously with bonding agent.

.2 Place concrete in accordance with CAN/CSA A23.1/A23.2-M.

.3 Slope concrete to levels shown on Contract Drawings.

.4 Do not place concrete at such a rate as to endanger formwork or to prevent proper compaction.

.5 Place concrete to prevent cold joints and segregation and vibrate sufficiently to ensure thorough compaction, maximum density in accordance to CAN/CSA A23.1/A23.2-M

.6 Check Work frequently with accurate instruments during placing of concrete.

.7 When completing concrete placement for day, carry placement through to a scheduled joint location.

.8 Where concrete placement is stopped for more than 30 minutes due to breakdowns, weather or any other reasons, construct extra bulkhead and construction joint as directed.

3.7 **CONCRETE CURBS**

.1 Align concrete curbs with curves and tangents indicated on drawings. Concrete curb to be in accordance to details indicated on drawings.

.2 Where existing curb is met, the contractor must make the required transition to style and grade of existing curb to the satisfaction of the Consultant.

.3 Curbs shall have expansion joints at minimum 4500 mm o.c. and in accordance with authorities having jurisdiction. Place reinforcing bars at top and base of curb, with minimum 50 mm concrete cover.

.4 All restoration of the existing road structure for the transition to existing curb is the responsibility of the contractor.

.5 Finish edges of dummy joints and expansion joints with 3 mm radius edging tool.

3.8 **CONCRETE PAVEMENTS**

.1 Concrete sidewalk to be in accordance with details indicated on drawings.

.2 Concrete for standard sidewalk to be 150 mm thick, except through entrances where the concrete shall be 200 mm thick with wire mesh. The compacted granular ‘A’ is to be 150 mm thick at all locations.

.3 Where existing sidewalk is met, make the required transition to grade, to the satisfaction of the Consultant. Furthermore, co-ordinate with the City and Consultant, to insure compatibility of existing and or future adjacent works by City forces.

.4 All structural concrete, such as but not limited to, concrete walkway adjacent to building, concrete pads for loading docks, and concrete slabs for loading areas to be constructed in accordance with reviewed shop drawings.

.5 Dummy joints: 6 mm deep at 1500 mm o.c. Tool joints with 6 mm wide steel trowel, radiusing edges 6 mm.

.6 Expansion joints: 6000 mm o.c. maximum.

.7 Tool edges of sidewalk with 50 mm wide steel trowel, radiusing edges 6 mm.

.8 Install sealant in expansion/isolation joints as shown and specified.

3.9 **CONSOLIDATING**

.1 Consolidate concrete in accordance with CAN/CSA A23.1/A23.2-M

.2 Work concrete into complete contact with forms and embedded items. Consolidate concrete adjacent to side forms and along entire length of forms to ensure a smooth surface finish after stripping of formwork.

3.10 **CURING AND PROTECTION**

.1 Cure and protect concrete in accordance with CAN/CSA A23.1/A23.2-M.

.2 Apply curing compound after finishing operations have been completed, at rate recommended by compound manufacturer. Ensure compound application is uniform and continuous over entire area being cured.

3.11 **CONSTRUCTION JOINTS**

.1 Obtain Consultant's acceptance to install construction joints in locations other than those shown.

.2 Construct construction joints to CAN/CSA A23.1-M and as shown. Supply and install dowels in construction joints unless otherwise detailed.

.3 Joints at building face or other abutments: place 12 mm joint filler keeping top 12 mm below concrete surface; apply kraft paper or polyethylene bond over filler and fill with self-levelling sealant applied in accordance with manufacturer’s printed instructions.

.4 For sawn joints:
- .1 Do sawn joints in accordance with drawing details. Prepare sample sawn joint for approval by Consultant.
- .2 Ensure joints are straight. Mark alignment with chalk line or other suitable guide. Layout to be approved by Consultant.
- .3 Saw joints using approved equipment and methods to produce joint dimensions indicated.

.4 Supply sufficient men and equipment including standby equipment, to maintain a satisfactory sawing schedule.

.5 Schedule sawing operations on 24 hour basis and consistent with concrete placing.

.6 Make initial saw cuts in a progressive manner and as soon as possible without excessive ravelling.

.7 If a crack occurs ahead of saw cut, stop immediately. Move ahead several joints and cut one or more joints before returning to saw intermediate joints. Where cracking persists, make 1060 mm saw cut from one edge and complete sawing from opposite edge. Adjust sawing schedule accordingly.

.8 If uncontrolled cracking or other surface damage results from inadequate or improper sawing techniques suspend further concrete operations until situation is corrected and immediately remove and replace damaged slabs.

.9 Immediately on completion of sawing, flush joints with water to remove laitance.

3.12 FINISHING

.1 When striking off concrete surface, maintain a uniform roll of concrete ahead of first screed for it's full length when finishing machine is on first pass.

.2 Where joints are formed rather than sawn, form longitudinal and transverse joints after final pass of finishing machine.

.3 Hand finish areas inaccessible to finishing machine to same quality and surface characteristics as machine finished surfaces.

.4 Finish concrete surface with an approved float at proper time. Operate from edge to edge with a wiping motion while advancing , with each succeeding pass overlapping previous one.

.5 Check surface with approved straightedge 4500 mm long. Correct irregularities exceeding 5 mm before concrete takes initial set.

.6 Finish edges of slabs with edging tool to form a smooth squared surface. Do not patch with cement paste.

3.13 IDENTIFICATION STAMP

.1 For sidewalks in the public right-of-way, mark concrete at each end of the work and at least every 18000 mm or such other places as the Consultant may select.

.2 The stamp shall be located on the centre of the bay of walk, next to and parallel to a transverse joint.

.3 The size and shape of the stamp shall be as shown on City of Toronto Drawings.

.4 The imprint shall be clear and legible and satisfactory to the Consultant.

3.14 **BROOM FINISH**

.1 Commence texturing immediately after float finishing.

.2 Use soft bristled broom to produce an approved light, non-slip concrete surface finish with fine granular or sandy texture free from disfigurations. Finishes to be approved by Consultant.

.3 Apply broom finish at right angles to curb and parallel to joints. All trowel and tool marks to be removed with broom. Do not contaminate joints by over-brooming.

3.15 **REMOVAL OF FORMS**

.1 Do not disturb forms until concrete has hardened and developed sufficient strength to safely support its own weight and load on it.

.2 Strip formwork in accordance with CAN/CSA A23.1-M.

3.16 **DEFECTIVE CONCRETE**

.1 Concrete is defective when:
- .1 Containing excessive honeycombing or embedded debris.
- .2 Concrete damaged by freezing or which is unsatisfactory due to placement at too high a temperature.
- .3 Average 28 day strength of any three consecutive strength tests is less than specified minimum 28 day strength.
- .4 Any 28 day strength test result is less than 80% of specified minimum 28 day strength.
- .5 Surface texturing, joint type and placement and tolerances are unacceptable in the opinion of the Consultant.

.2 Repair of defective concrete work:
- .1 Repair defective areas while concrete is still plastic, otherwise wait until curing is completed. Use repair methods approved by Consultant.
- .2 Grind off high surface variations where directed.

.3 Remove and replace defective concrete where directed.
- .1 Remove minimum 3000 mm of pavement by sawing through concrete across full lane width.
- .2 Replace with new concrete to this specification.
- .3 Construct dummy contraction joint between sawn face of existing concrete and face of new concrete.

3.17 **PROTECTION**

.1 Do not open concrete pavement to traffic or construction equipment until concrete reaches 70% of specified strength or until approved by Consultant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment, tools, and services necessary for painted traffic lines Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CAN/CGSB-1.5M, Low Flash Petroleum Spirits Thinner.

.2 CGSB1-GP-71, Method, of Testing Paints and Pigments.

.3 CAN/CGSB 1.74, Alkyd Traffic Paint.

1.3 **SUBMITTALS**

.1 Samples: Submit samples in accordance with Section 01 10 10 for the following:
- .1 Two 1L samples of each type of paint.
- .2 Sampling to CGSB1-GP-71.
- .3 Mark samples with name of project and its location, paint manufacturer's name and address, name of paint, CGSB specification number and formulation number and batch number.

.2 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.4 **SITE CONDITIONS**

.1 Do not install Work of this Section outside of following environmental ranges without Consultant's and Product manufacturer's written acceptance:
- .1 Ambient air and surface temperature: 10° C.
- .2 Precipitation: None within 4 hours.
- .3 Wind speed: less than 60 km/h.

2 Products

2.1 **MATERIALS**

.1 Traffic paint: CAN/CGSB 1.74, new pavement markings, white or yellow as selected by Consultant.

.2 Thinner: to CAN/CGSB 1.5-M.

3 Execution

3.1 **EQUIPMENT REQUIREMENTS**

.1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single, double and dashed lines. Applicator to be capable of applying marking components uniformly and to dimensions as indicated, and to have positive shut-off.

3.2 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.

3.3 **APPLICATION**

.1 Spray paint parking zone lines and other pavement markings indicated, included, but not limited to, hash marks for no parking areas, direction arrows and handicap parking symbols.

.2 Apply paint evenly at rate of $3m^2/L$.

.3 Do not thin paint.

.4 Symbols and letters to conform to dimensions indicated and be applied with template.

.5 Unless otherwise indicated, paint lines 125 mm wide. Paint lines to be of uniform colour and density with sharp edges.

.6 Paint lines straight, or uniformly curved, with well defined edges and full paint coverage in all locations.

3.4 **TOLERANCE**

.1 Paint markings to be within plus or minus 12mm of dimensions indicated.

3.5 **PROTECTION**

.1 Protect pavement markings until dry.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for chain link fencing Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CAN/CSA A23.1/A23.1-M, Concrete Materials and Methods of Concrete Construction/Methods of Tests for Concrete.

.2 CAN/CGSB 1.181-M, Ready Mixed Organic Zinc-Rich Coating.

.3 CAN/CGSB 138.1-M, Fence, Chain Link, Fabric.

.4 CAN/CGSB 138.2-M, Fence, Chain Link, Framework, Zinc-Coated, Steel.

.5 CAN/CGSB 138.3-M, Fence, Chain Link - Installation.

.6 CAN/CGSB 138.4-M, Fence, Chain Link, Gates.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
  - .1 Adjacent construction, elevations and details, dimensions, gauges, finishes and relationship to adjacent construction.
  - .2 Show methods of fastenings, accessory items required, gate details, structural header design and design computations, and other pertinent data and information.

.3 Samples:
- .1 Submit following samples in accordance with Section 01 10 10.
  - .1 300 mm square wire fabric mesh.
  - .2 One top and bottom shoe.

.4 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.

.2 Identify each regionally extracted and manufactured material, its source and cost.

.3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

1.4 **QUALITY ASSURANCE**

.1 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in the installation of fencing of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Fencing:
- .1 Clotures Prepa Fences (Frost Fence).
- .2 Lundy Fence and Deck.
- .3 Master Halco Inc.

2.2 **MATERIALS**

.1 Chain-link fence fabric: CAN/CGSB 138.1, Type 1, Class A, Style 2, Grade 2. Galvanized after woven, top selvedge twisted and barbed, bottom selvedge knuckled. Height as indicated on Contract Drawings.

.2 Posts, braces and rails: CAN/CGSB 138.2; Schedule 40 pipe, size, thickness, diameter and length to meet standard. Minimum galvanizing weight: 610 g/m^2 of uncoated base metal surface.

.3 Bottom tension wire and tie wire fasteners: CAN/CGSB 138.1; Zinc-coated steel wire and zinc coating, same diameter as specified for chain link fence fabric.

.4 Tension bar: 19 x 4.88 mm galvanized steel.

.5 Tension bar bands: 33 x 19 mm minimum galvanized steel.

.6 Gates, gate frames and accessories: CAN/CGSB 138.4, Schedule 40 galvanized steel pipe, minimum galvanizing weight to be 610 g/m^2 at uncoated base metal surface.

.7 Fittings and hardware: Galvanized steel with minimum galvanizing weight of 610g/m^2 of uncoated base metal.
- .1 Post caps: Waterproof fit, to fasten securely over posts and, to carry top rail.

.2 Turnbuckles: Drop forged.

.8 Zinc rich coating: CGSB 1-GP-181-M, organic zinc-rich coating.

2.3 **FABRICATION**

.1 Fabricate gates as indicated on Contract Drawings with electrically welded joints, and hot-dip galvanized after welding.

.2 Fabricate gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.

.3 Fasten fence fabric to gate with twisted selvage at top.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **GRADING**

.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts. Make clearance between bottom of fence and ground surface 30 mm to 50 mm.

3.3 **ERECTION OF FENCE**

.1 Lay out lines and establish elevations required for correct location and setting of fence posts, framing and fabric to suit Site contours.

.2 Erect fence along lines as indicated on Contract Drawings and in accordance with CAN/CGSB-138.3.

.3 Auger post holes to depths and dimensions indicated on Contract Drawings and in accordance with CAN/CGSB-138.3. Form top 250 mm with concrete forms.

.4 Space line posts maximum 3000 mm apart, measured parallel to ground surface.

.5 Space straining posts at equal intervals 50 m maximum between end or corner posts on straight continuous lengths of fence and over smooth grade.

.6 Install additional straining posts at changes in grade and where shown on Contract Drawings.

.7 Install corner post where change in alignment exceeds 10^0.

.8 Install end posts at end of fence and at walls. Install gate posts on both sides of gate openings.

.9 Secure posts into top and bottom shoes as indicated on Contract Drawings. Brace posts in plumb position and true to alignment and elevation until completely secured.

.10 Do not install fence fabric until all shoes are properly secured.

.11 Install brace between end and gate posts and nearest line post, at inclination as indicated on Contract Drawings. Install braces on both sides of corner and straining post in similar manner.

.12 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.

.13 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands. Place 150 mm from bottom of fabric.

.14 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals. Knuckled selvage at bottom. Twisted selvage at top. Make closures by splicing fabric to form a continuous mesh.

.15 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450 mm intervals. Give tie wires minimum two twists.

3.4 **INSTALLATION OF GATES**

.1 Install gates in locations as indicated on Contract Drawings.

.2 Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.

.3 Determine position of centre gate rest for double gate. Cast gate rest in concrete as directed. Dome concrete above ground level to shed water.

.4 Install gate stops where indicated on Contract Drawings.

3.5 **TOUCH UP**

.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich coating to damaged areas in accordance with manufacturer's instructions.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for foundation drainage Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

.2 ASTM F449, Standard Practice for Subsurface Installation of Corrugated Polyethylene Pipe for Agricultural Drainage or Water Table Control.

.3 ASTM F667, Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit manufacturer's Product data in accordance with Section 01 10 10 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Samples:
- .1 Submit following samples in accordance with Section 01 10 10:
  - .1 Two 300 x 300 mm samples of drainage board.
  - .2 Two 300 mm long samples of perimeter drainage and/or pipe.

.3 LEED submittals: Submit all applicable supporting documentation for approval of LEED Consultant.
- .1 Indicate cost, post consumer and pre-consumer recycled content for each product.
- .2 Identify each regionally extracted and manufactured material, its source and cost.
- .3 Complete the attached LEED Material Credits Documentation Sheet for products supplied under this Section. All forms are to be submitted with shop drawings and shop drawings will not be reviewed until all documentation is received.

2 Products

2.1 **MATERIALS**

.1 Perimeter drainage:
- .1 ASTM D3350 and ASTM F667, 100 mm diameter HDPE, perforated with fittings prewrapped with filter cloth by Ideal Pipe or approved alternative or 'TREMDrain Total Drain' by Tremco Inc.
- .2 Perimeter drainage system to be complete with accessories as required for complete installation including but not limited to corner guard pieces and outlet pipe connections.

.2 Drainage board:
- .1 Base: Three-dimensional dimpled core and geotextile fabric complete with adhesive or fasteners as required for installation. 'Miradrain 2000' by Carlisle Coatings and Waterproofing, 'Delta MS' by Cosella-Dorken, 'TREMDrain' by Tremco Inc. or 'Mel-Drain 5012' by W. R. Meadows.
- .2 Alternate: Three-dimensional high impact polystyrene core and a nonwoven filter fabric complete with adhesive or fasteners as required for installation. 'Miradrain 6000' by Carlisle Coatings and Waterproofing, 'Delta-Drain 6200' by Cosella-Dorken, 'TREMDrain 1000' by Tremco Inc. or 'Sealtight Mel-Drain 5035-B' by W. R. Meadows.

.3 Clean outs: 100 mm PVC outlets , tees, extension pipes, reducers, flush plugs, etc. suitable for use with drainage pipe as manufactured by Canron Inc, CGC or approved alterative.

.4 Foundation drainage Pipe Fill: 19 mm clear stone in accordance with OPSS 1004.

.5 Granular fill: Free draining, sharp, hard, durable, granular material conforming to OPSS 1010, Type A.

.6 Filter cloth: Terrafix 270R as manufactured by Terrafix Geosynthetics Inc. or approved equivalent.

.7 Seam tape: 50 mm wide butyl rubber sealant tape; 'Volclay SeamTape' by CETCO or approved alternative.

.8 Waterproofing boot: Performed EPDM tie-back cover or field fabricated 26 gauge galvanized sheet metal; 'Volclay TB-Boot' by CETCO or approved alternative.

3 Execution

3.1 **EXAMINATION**

.1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PREPARATION**

.1 Verify substrate surfaces are solid, free from surface water, frozen matter, dust, oil, grease, scaling or laitance, projections and any other foreign matter detrimental to installation.

3.3 **INSTALLATION**

.1 Install perimeter drainage around perimeter of basement and elevator pits and where indicated on Drawings.

.2 Install drainage board in accordance with ASTM F449 and manufacturer's recommendations. Drainage board shall extend full height of foundation wall to top of footing where indicated on Drawings. Install drainage board after installation of waterproofing membrane is complete. Position panel with flat side against wall and filter fabric toward soil/drainage side and attach to foundation wall using manufacturer approved fastening system.

.3 Provide unperforated drainage pipe between perforated drainage pipe and drain connection installed by Division 22 and 23.

.4 Install drainage pipe on a bed of foundation drainage fill, minimum 100 mm deep where pipe is not placed over footing, and surround with same fill 150 mm thick at sides and over top of pipe and for under floor drainage extend fill to under side of slab.

.5 Provide cleanouts on non-perforated pipe at all changes of direction and in pipe runs greater than 15 metres. Provide flush cleanouts where indicated.

.6 Cover foundation drainage fill with filter cloth. Cover filter cloth with sand 300 mm thick at top and sides.

.7 Seal vertical drainage boards around shoring tiebacks and install seam tape and waterproofing boot in accordance with manufacturer’s written instructions with necessary fasteners and accessories for complete installation.

END OF SECTION