MOSAIC CENTRE FOR CONSCIOUS COMMUNITY & COMMERCE

ISSUED FOR CONSTRUCTION
VOLUME 4

Project No. 21-3180 | May 9, 2014 | Edmonton, AB

MANASC ISAAC ARCHITECTS LTD.
10225 100 AVENUE EDMONTON, AB T5J 0A1 CANADA
T: 780.429.3977 MANASCISAAC.COM

Division 01 - General Requirements

Division 03 - Concrete

Division 04 - Masonry

Division 05 - Metals

Division 06 - Wood, Plastics and Composites

Division 07 - Thermal and Moisture Protection

Division 32 - Exterior Improvements

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 This section specifies concrete finishing for vertical and horizontal surfaces.

.2 Related Sections:

.1 Section 03 10 00 – Concrete Formwork

.2 Section 03 30 00 – Cast-in-Place Concrete

.3 Section 09 96 59 – High-Build Glazed Coating

.4 Section 12 48 13 – Entrance Floor Grids

1.2 REFERENCES

.1 American Concrete Institute (ACI)

.1 ACI 302.1R, Guide for Concrete Floor and Slab Construction

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM D1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.2 ASTM D1752-04a(2008), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.3 ASTM E1155-96(R2001), Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-25.20- 95, Surface Sealer for Floors.

.4 Canada Green Building Council (CaGBC)

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

.5 Canadian Standards Association (CSA)

.1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete, Includes Updates through No. 3 August 2006.

.6 International Concrete Repair Institute (ICRI)

.1 ICRI 03732P-1997, Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays.

.7 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1113-04, Architectural Coatings.

1.3 QUALITY ASSURANCE

.1 Product quality and quality of work in accordance with Section 01 61 00 - Common Product Requirements.

.2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

1.4 ACTION SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.

.1 Submit manufacturer's printed product literature, specifications and data sheet for each product specified.

.2 Submit WHMIS MSDS - Material Safety Data Sheets. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content.

.3 Include application instructions for concrete floor treatments.

.2 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Documentation must address 100% of ingredients.

.4 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as “mixture” are not acceptable.

.1 Each components of a mixture shall be identified.

.5 Provide documentation as required for LEED Submittals:

.2 MR Credit 4 – Recycled Content.

.3 MR Credit 5 – Regional Materials.

.4 IEQ Credit 4.1 – Low-Emitting Materials: Adhesives and Sealants.

.5 IEQ Credit 4.3 – Low-Emitting Materials: Flooring Systems.

1.5 CLOSEOUT SUBMITTALS

.1 Submit closeout data in accordance with Section 01 78 00 – Closeout Submittals.

.1 Provide manufacturer’s printed recommendations for general maintenance, including cleaning instructions and submit a complete list of floor care products that will be required for on-going maintenance.

1.6 SITE REQUIREMENTS

.1 Temporary lighting:

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

.2 Electrical power:

.1 Provide sufficient electrical power to operate equipment normally used during construction.

.3 Work area:

.1 Make the work area water tight protected against rain and detrimental weather conditions.

.4 Temperature:

.1 Maintain ambient temperature of not less than 10 degree C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.

.5 Moisture:

.1 Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer.

.6 Safety:

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

.7 Ventilation:

.1 Arrange for ventilation system to be operated during installation of concrete floor treatment materials by use of approved portable supply and exhaust fans.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.3 Provide continuous ventilation during and after coating application.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Waste Management and Disposal.

Part 2 Products

2.1 PERFORMANCE/DESIGN CRITERIA

.1 Class A Finishing: Floors having a straightedge value of ±8 mm over 3050 mm with overall F-number of F_F 20 x F_L 15; meeting requirements for CSA A23.1 Class A slab finishing.

.2 Class B Finishing: Floors having a straightedge value of ±6 mm over 3050 mm with overall F-number of F_F 25 x F_L 20; meeting requirements for CSA A23.1 Class B slab finishing.

.3 Class C Finishing: Floors having a straightedge value of ±5 mm over 3050 mm with overall F-number of F_F 35 x F_L 25; meeting requirements for CSA A23.1 Class C slab finishing.

2.2 MATERIALS

.1 Levelling Materials:

.1 Underlayment: Cementitious, self levelling, single component, polymer modified underlayment and manufacturer's low VOC recommended primer, for application thicknesses to a minimum feather edge to 13 mm.

.2 Sealer and Hardener: (CS-H)

.1 Type: 1, Sodium silicate, permanent penetrating sealer and hardener

.1 Liquid applied, water based, chemically reactive.

.2 Non-toxic, non-flammable, and anti-dusting have low or no VOC.

.3 Colour: colourless

.4 Acceptable Materials:

.1 Sealtight Liqui-Hard, W.R. Meadows

.2 Water: potable.

.3 Abrasive Finish (CS-A):

.1 Description: Polyurethane particle pieces designed to blend and into concrete sealing material.

.1 Ensure compatibility of systems.

.2 Silica particles within the abrasive grit are unacceptable.

.4 Curing Compounds

.1 Select low VOC, water-based, organic-solvent free curing compounds.

.1 Concrete Curing Compounds: maximum VOC limit 350 g/L in accordance with SCAQMD Rule #1113.

2.3 MIXES

.1 Mixing, ratios and application in accordance with manufacturers instructions.

2.4 ACCESSORIES

.1 Joint Filler Strips:

.1 Floor Isolation Joints: ASTM D1751, bituminous impregnated fibreboard, or ASTM D1752, cork or self-expanding cork, 13 mm thick minimum.

.2 Edge Joint Filler: ASTM D1751, bituminous impregnated fibreboard, 13 mm thick minimum.

.2 Control Joint Filler:

.1 Two component, epoxy-urethane, load bearing, self-levelling sealant.

.1 Acceptable Material:

.1 Loadflex, Sika Canada

.2 Quikjoint 200, EUCO

Part 3 Execution

3.1 EXAMINATION

.1 Prepare floor surface in accordance with CSA A23.1.

.2 Verify that slab surfaces are ready to receive work and elevations are as instructed by manufacturer.

3.2 REPAIRS

.1 Inspect surfaces for defects immediately after removal of forms. Repair or patch defects within 48 hours of removal of forms with cure repairs same as new concrete with Architect's permission.

.2 Defective Areas: where patches are allowed, repair and patch areas to match surrounding areas in texture and colour.

3.3 FINISHES FOR FORMED SURFACES

.1 Unspecified Finish: Provide following finishes as applicable when finish of formed surfaces is not specifically indicated:

.1 Rough form finish for all concrete surfaces not exposed to public view.

.2 Smooth form finish for all concrete surfaces exposed to public view.

.2 Rough Form Finish: Leave surfaces with texture imparted by forms; patch tie holes and defects; remove fins longer than 6 mm high.

.3 Smooth Form Finish: Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces with number of seams kept to a minimum, uniformly spaced in an orderly pattern; patch tie holes and defects; completely remove fins.

.4 Penetrating Sealer Finish: Apply penetrating sealer to vertical surfaces after any patching, joint sealing or caulking is completed in accordance with manufacturer's written instructions.

3.4 FINISHING FLOORS AND SLABS

.1 Finish floors and slabs in accordance with CSA A23.1 and ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces; do not wet concrete surfaces.

.2 Schedule of finishing:

.1 Exterior Slabs: Class B with a broom finish;

.2 Interior Concrete Floor with Epoxy Finish: Class A;

.3 Interior Concrete Floor with Cork/Reclaimed Material Finish: Class C.

.4 Interior Concrete Floor with Sealed and Hardened Finish: Class C; and

.5 Interior Concrete Floor with Abrasive Finish: Class C.

.3 Unspecified: Provide the following finishing classes as applicable when finishing requirements for floors is not specifically indicated:

.1 Interior Concrete Floors: Class C.

.4 Float (Initial) Finishing:

.1 Consolidate surface with power driven floats or by hand floating if area is small or inaccessible to power driven floats.

.2 Re-straighten, cut down high spots, and fill low spots.

.3 Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

.4 Apply float finishing to surfaces indicated and receiving trowel finishing.

.5 Trowel (Final) Finishing:

.1 Commence trowel finishing after all bleed water has disappeared and when the concrete has stiffened sufficiently to prevent the working of excess mortar to the surface.

.2 Apply first trowelling and consolidate concrete by hand or power-driven trowel after applying float finishing; continue trowelling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance; repair or smooth any surface defects that would telegraph through applied coatings or floor covering.

.3 Apply a trowel finishing to surfaces indicated, exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

.4 Finish surfaces to the tolerances indicated above.

.6 Broom Finishing:

.1 Apply a broom finishing to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

.2 Slightly roughen trafficked surface by brooming with fibre bristle broom perpendicular to main traffic route immediately after float finishing.

.3 Coordinate required final finishing with Architect before application.

3.5 APPLICATION: GENERAL

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

.2 Apply floor treatment in accordance with Sealer manufacturer's written instructions.

.3 Clean overspray. Clean sealant from adjacent surfaces.

.4 Cure concrete in accordance with manufacturers recommended procedures.

3.6 APPLICATION: ABRASIVE FINISH

.1 Mix abrasive materials with sealer and apply to surfaces as instructed by manufacturer’s instructions.

3.7 APPLICATION: LIQUID APPLIED FLOOR HARDENER

.1 Apply liquid floor hardener in accordance with manufacturer's written instructions after initial floating.

.2 Cure concrete in accordance with manufacturer’s recommended instructions.

3.8 PROTECTION & CLEAN-UP

.1 Clean-up: Maintain control of concrete chips, dust, and debris in each area of the work. Clean up and remove such material at the completion of each day of operation. Prevent migration of airborne materials by use of tarpaulins, wind breaks, and similar containing devices.

.2 Protect finished installation in accordance with manufacturer's instructions.

3.9 MAINTENANCE

.1 Provide training to Owner's maintenance team based on written manufacturers instructions as indicated in Section 01 78 00 – Closeout Submittals.

3.10 SCHEDULE

.1 Refer to Drawings for Room Finish Schedule for locations of sealer and abrasive finish.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Structural steel framing members.

.2 Base plates.

.3 Grouting under base plates.

.4 Shear stud connectors.

1.2 RELATED SECTIONS

.1 Section 01 35 60 - Sustainable Certification Requirements and Submittals.

.2 Section 05 31 00 - Steel Decking.

.3 Section 09 90 00 - Painting.

.4 Section 09 96 00 - High-Performance Coatings.

1.3 REFERENCES

.1 ASTM A53/A53M-10 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

.2 ASTM A108-07 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.

.3 ASTM A123/A123M-09 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.4 ASTM A153/A153M-09 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.5 ASTM A325-10 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.6 ASTM A370-12a - Standard Test Methods and Definitions for Mechanical Testing of Steel Products.

.7 ASTM A490-12 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensil Strength.

.8 ASTM A563-07a - Standard Specification for Carbon and Alloy Steel Nuts.

.9 ASTM A780/A780M-09 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

.10 ASTM F436-11 - Standard Specification for Hardened Steel Washers.

.11 ASTM F959-13 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.

.12 ASTM F1554-07ae1 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

.13 ASTM F1852-11 - Standard Specification for “Twist Off” Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.14 ASTM F2280-12 - Standard Specification for “Twist Off” Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 150 ksi Minimum Tensile Strength.

.15 AWS A2.1 - Welding Symbols Chart.

.16 AWS D1.1-2006 - Structural Welding Code - Steel.

.17 CISC - Code of Standard Practice.

.18 CISC/CPMA 1-73a - Quick-Drying One-Coat Paint for Use on Structural Steel.

.19 CISC/CPMA 2-75 - Quick-Drying Primer for Use on Structural Steel

.20 CSA G40.20-04/G40.21-04 (R2009) - General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.

.21 CSA S16-09 - Design of Steel Structures.

.22 CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel.

.23 CSA W59-03 (R2008) - Welded Steel Construction (Metal Arc Welding).

.24 MPI (The Master Painters Institute) - Approved Products List.

.25 SSPC (The Society for Protective Coatings) - Steel Structures Painting Manual.

.26 Alberta Building Code 2006.

.27 For Projects overseen by a Construction Manager in lieu of a General Contractor, references to “Contractor” shall apply to the relevant Subcontractor(s).

1.4 PERFORMANCE REQUIREMENTS

.1 Design all trusses and connections not detailed on the Drawings to the reference standards unless noted otherwise.

.2 Design connections for the forces shown on the Drawings and allow for the effects of beam deflections. Where forces are not given, design beam end connections for minimum one-half the shear capacity of the section. Provide a minimum of two 19mm diameter A325 bolts or an equivalent weld for all beam to girder connections.

.3 Design all column-to-beam and column-to-girder connections for a horizontal stability force in all directions equal to 2% of the design column axial load acting simultaneously with all other loads.

1.5 SUBMITTALS

.1 Shop Drawings: Show fabrication and erection of structural steel components.

.1 Submit erection drawings.

.1 Indicate member locations, elevations, and spacing. Label each member with a piece number or other unique mark.

.2 Do not reproduce structural Drawings for use as erection drawings.

.2 Submit piece drawings for each member.

.1 Indicate piece number or mark, member size, material specification, surface preparation, and finish.

.2 Include details of cuts, connections, splices, camber, holes, and other pertinent data.

.3 Indicate welds by standard AWS A2.1 symbols, distinguishing between shop and field welds. Show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.

.4 Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pre-tensioned and slip-critical, high-strength bolted connections.

.3 Submit erection drawings and piece drawings together in coordinated packages for review by the Consultant.

.4 Review of shop drawings constitutes review of general methods only and will not include approval of dimensions, figures, or quantities. The steel fabricator is responsible for structural design, correct fabrication, and proper fitting of various items.

.2 Connection Design Calculations: For connections indicated to comply with performance requirements, where requested. Calculations shall be signed and sealed by the qualified Professional Engineer responsible for their preparation, experienced in the design of this Work and licensed at the place where the Project is located.

.3 Mill Test Reports: For structural steel, including chemical and physical properties, where requested.

.4 Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on the Work, verifying CSA qualification within the previous 12 months.

.5 Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Where requested.

.6 Weld Samples: Provide samples of fillet and butt welds of architectural (A) and standard (S) types on minimum 150mm material.

.1 Type A (Architectural) Welds: Continuous, formed with ‘rod’ or ‘stick’ application, with even surface, bead width not to vary by more than plus or minus 2mm. Butt welds to be filled with metal filled and sanded smooth. No weld splatter.

.2 Type S (Standard) Welds: Spot or continuous welds formed with ‘wire’ application.

.3 All visible welds within 3 meters vertically and horizontally of an accessible viewpoint are to be Type A. All other welds are Type S unless noted otherwise on the Drawings.

.7 Test and Inspection Reports: As required by “Source Quality Control” and “Field Quality Control” articles of this Specification Section.

.8 Sustainable Design: Per Section 01 35 60 - Sustainable Certification Requirements and Submittals. Submit Regional Materials/Recycled Content Statement and mill certificates for the Steel.

1.6 QUALITY ASSURANCE

.1 Fabricate structural steel members to CISC Code of Standard Practice, CSA W47.1, and CSA W59.

.2 All steel fabricators and erectors must have full approval of the Canadian Welding Bureau under CSA W47.1.

.3 All welders employed on the Work must have passed the qualification test as set forth in CSA W47.1 within the preceding 12 months.

.4 Design connections not detailed on the Drawings under direct supervision of a Professional Engineer experienced in design of this Work and licensed at the place where the Project is located. Drawings of components designed by the steel fabricator shall be signed and sealed by the Professional Engineer.

.5 The Professional Engineer sealing the Contractor's shop drawings is also responsible for all field review of his or her Work. The Engineer shall provide signed and sealed letters of assurance to the Consultant confirming the Work has been completed in accordance with the final reviewed shop drawings and all structural requirements.

1.7 STORAGE AND HANDLING

.1 Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

.1 Do not store materials on structural in a manner that might cause distortion, damage, or overload to members or supporting structures.

.2 Report all bends and damage to the Consultant for instructions.

.3 Structural steel Contractor shall repair or replace steel Work which is bent, broken, or otherwise damaged, at no cost to the Owner, at the Consultant's request.

.2 Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

.1 Fasteners may be repackaged provided Owner's testing and inspection agency observes repackaging and seals containers.

.2 Clean and relubricate bolts and nuts that become dry or rusty before use.

1.8 COORDINATION WITH OTHER TRADES

.1 Supply all necessary instructions and drawings to other trades for setting bearing plates, anchor bolts, and other members that are built in with the Work of other trades. Supply the necessary material in accordance with the construction schedule.

Part 2 Products

2.1 SUSTAINABLE DESIGN

.1 Refer to Section 01 35 60 for sustainable design requirements. Structural Steel to contain 75% recycled content and 90% total recycled content. Fabricator to provide mill certificate to verify recycled content.

2.2 MATERIALS

.1 All steel shall be new unless noted otherwise and shall be of sizes, grades, and shapes listed in the current CISC handbook and as indicated on the Drawings.

.2 Rolled W-Shapes, Welded Wide Flange Sections, and Channels: CSA G40.20/G40.21 Grade 350W.

.3 Other Rolled Shapes: CSA G40.20/G40.21 Grade 300W.

.4 Plates, and Flat Bars: G40.21 Grade 300W.

.5 Hollow Structural Sections: CSA G40.20/G40.21 Grade 350W, Class C.

.6 Pipe: ASTM A53/A53M, Grade B.

.7 Shear Stud Connectors: ASTM A108, Grades 1015 through 1020, headed-stud type.

.8 Bolts, Nuts, and Washers: ASTM A325, ASTM A490, ASTM F1852, or ASTM F2280 bolts, ASTM A563 nuts, and ASTM F436 washers, galvanized to ASTM A153 for galvanized structural members.

.9 Direct Tension Indicator Washers: ASTM F959.

.10 Anchor Bolts: ASTM F1554, Grade 36.

.11 Welding Materials: Type required for materials being welded. Welding consumables for all processes shall be fully approved by the Canadian Welding Bureau and certified by the manufacturers as complying with the requirements of this Specification. Such certificates shall be no more than two years old.

.12 Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, capable of developing minimum compressive strength of 17 MPa in 48 hours and 48 MPa in 28 days.

.13 Shop and Touch-Up Primer for Interior Exposure: CISC/CPMA 1-73a.

.14 Shop and Touch-Up Primer for Interior Exposure, Exposed to View: CISC/CPMA 2-75.

.15 Shop and Touch-Up Primer for Exterior Exposure: Compatible with substrate and with coating system as specified in Section 09 91 00 or Section 09 96 00.

.16 Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20, high-zinc-dust-content paint with dry film containing not less than 94% zinc dust by weight.

2.3 FABRICATION

.1 Structural Steel: Fabricate to CSA S16 and in accordance with structural Drawings and reviewed shop drawings. Fabricate and assemble in shop to greatest extent possible.

- .1 Fabricate units straight and true, without sharp kinks or bends.
- .2 Camber structural steel members where indicated.
- .3 Fabricate beams with rolling camber up.
- .4 Close all hollow structural sections airtight with end plates sealed with welds. Provide drain hole at base.
- .5 Mark and match-mark materials for field assembly.
- .6 Complete structural steel assemblies, including welding of units, before starting shop priming operations.
- .7 If sizes of members shown on the Drawings are unavailable, provide available equivalent member next size (or thickness) larger.

.2 Welding: Weld to CSA W59 using welders qualified in accordance with CSA W47.1.

.3 Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

.4 Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, “Hand Tool Cleaning,” or SSPC-SP 3, “Power Tool Cleaning.”

.5 Shear Connectors: Prepare steel surfaces as recommended by manufacturer or shear connectors. Fillet weld connectors to steel members; fusion machine welds are not permitted, except for composite steel floor deck per Section 05 31 00.

.6 Holes: Provide holes required for securing other Work to structural steel and for other Work to pass through steel members.

.1 Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.

.2 Base Plate Holes: Cut, drill, mechanically thermally cut, or punch holes perpendicular to steel surfaces.

2.4 SHOP PRIMING

.1 Shop prime steel surfaces except the following:

.1 Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 50mm.

.2 Surfaces to be field welded.

.3 Surfaces of high-strength bolted, slip-critical connections.

.4 Surfaces to receive sprayed fire-resistive materials (applied fireproofing).

.5 Galvanized surfaces.

.2 Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits.

.1 Prepare surfaces according to primer manufacturer's written instructions, at minimum to SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning."

.2 Prepare surfaces to be primed for exterior exposure or to receive a shop or field paint finish according to primer manufacturer's written instructions, at minimum to SSPC-SP 6, "Commercial Blast Cleaning."

.3 Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.5 GALVANIZING

.1 Hot Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A123. Galvanize hardware according to ASTM A153.

.1 Fill vent and drain holes that are exposed in the finished Work, unless they function as weep holes, by plugging with zinc solder and filing off smooth.

.2 Galvanize all items permanently exposed to weather, unless noted otherwise on the Drawings.

2.6 SOURCE QUALITY CONTROL

.1 Testing Agency: Owner will engage and pay for the services of a qualified testing agency to perform shop tests and inspections.

.1 Provide a schedule of shop fabrication prior to commencement of Work.

.2 Provide testing agency with access to places where structural steel Work is being fabricated or produced to perform tests and inspections.

.2 Bolted Connections: Inspect and test shop-bolted connections according to CSA S16.

.3 Welded Connections: Visually inspect all shop-welded connections according to CSA W59. Perform ultrasonic tests of all complete joint penetration (CP) welds according to CSA W59.

.4 Submit certified results of testing to the Consultant.

.5 If more than 5% re-inspection is required due to faulty workmanship, the structural steel Subcontractor is required to pay for this re-inspection.

Part 3 Execution

3.1 EXAMINATION

.1 Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

.1 Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

.2 Report in writing to the Consultant all discrepancies between measurements at the building and those shown on the Drawings, prior to commencing Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Supervise the setting of bases, anchor bolts, and other steel-to-concrete connections. Do not cut base plates to accommodate anchor bolts.

.2 Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against wind loads, seismic loads, temporary construction loads, and loads equal in intensity to design loads. Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the structural steel Subcontractor.

.3 Remove temporary supports when permanent structural steel, connections, and bracing are in place unless noted otherwise.

3.3 ERECTION

.1 Set structural steel accurately in locations and to elevations indicated, according to CSA S16 and reviewed erection drawings.

.2 Base Plates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

.1 Set plates for structural members on wedges, shims, or setting nuts as required.

.2 Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims, but, if protruding, cut off flush with edge of plate before packing with grout.

.3 Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces. Protect grout and allow to cure.

.3 Maintain erection tolerances of structural steel according to CSA S16.

.4 Align and adjust various members that form part of the complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

.1 Level and plumb individual members of the structure.

.2 Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

.5 Splice members only where indicated.

.6 Do not field cut or alter structural members without written approval of the Consultant.

.7 Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

.1 High-Strength Bolts: Install according to CSA S16 for type of bolt and type of joint specified.

.2 Weld Connections: Weld by the shielded metal-arc method in accordance with the requirements of CSA W59 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding Work.

.1 Remove all loose scale, rust, paint, or other foreign matter from surfaces to be welded.

.2 Where weld material is deposited in two or more layers, clean each layer before the next layer is deposited.

.3 Take care to minimize stresses due to heat expansion, contraction, and distortion.

.4 Finish all exposed welding to provide the best possible visual appearance to the satisfaction of the Consultant and the Architect.

3.5 FIELD QUALITY CONTROL

.1 Testing Agency: Owner will engage and pay for the services of a qualified testing agency to perform field tests and inspections.

.1 Provide a schedule of steel erection prior to commencement of Work.

.2 Provide testing agency with access to places where structural steel Work is being erected to perform tests and inspections.

.2 Bolted Connections: Inspect and test field-bolted connections according to CSA S16.

.3 Welded Connections: Visually inspect all field-welded connections according to CSA W59. Perform ultrasonic tests of all complete joint penetration (CP) welds according to CSA W59. Perform magnetic particle tests of 15% of all field fillet welds.

.4 Testing agency will report inspection results promptly and in writing to Contractor, Consultant, and Architect.

.5 Remove and replace work that does not comply with specified requirements.

.6 If more than 5% re-inspection is required due to faulty workmanship, the structural steel Subcontractor is required to pay for this re-inspection.

3.6 REPAIRS AND PROTECTION

.1 Galvanized Surfaces: Clean areas where galvanizing is damaged or missing. Repair galvanizing to comply with ASTM A780.

.2 Touch-Up Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to

comply with SSPC-PA 1 for touching up shop-painted surfaces. Clean and prepare surfaces by SSPC-SP 2, “Hand Tool Cleaning,” or SSPC-SP 3, “Power Tool Cleaning.”

.3 Painting: Paint to requirements of Section 09 90 00.

.4 Provide final protection and maintain conditions to ensure that structural steel is without damage or deterioration at time of Substantial Completion.

3.7 CLEANUP

.1 Make good to the satisfaction of the Architect any damage or injury to the Work of other trades. Remove all debris and scrap resulting from the execution of this trade.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Requirements for delegated design of wall framing system to resist wind loads and account for building movements in accordance to Section 01 35 00 – Delegated Design including, but not limited to the following components:

.1 Exterior wall areas except at composite curtainwall and at concrete wall areas.

.2 Studs subjected to lateral wind loads

.3 Top and bottom tracks

.4 Bridging and bracing

.5 Top and bottom track connections to main structure, including fabrications to accommodate main structure deflections; top of wall anchor allowing for dead load deflections during construction and live load deflections after construction.

.6 Head, sill, and jamb members at wall openings

.7 Framing components and connections.

.2 Related Sections

.1 Section 01 35 00 – Delegated Design

.2 Section 06 11 00 – Wood Framing

.3 Section 08 11 13 – Steel Doors and Frames

.4 Section 08 44 12 – Composite Curtain Wall & Assemblies

.5 Section 09 21 16 – Gypsum Board Assemblies

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM A591/A591M-89, Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications.

.2 ASTM A653/A653 M-00, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM A792/A792M-99, Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Canada Green Building Council (CaGBC)

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

.4 Canadian Standards Association (CSA)

.1 CSA A370-04, Connectors for Masonry

.2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA S136-94(R2001), Cold Formed Steel Structural Members.

.4 CSA W47.1-03, 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).

.5 Canadian Sheet Steel Building Institute (CSSBI)

.1 CSSBI 51-06, Lightweight Steel Framing Manual – 2nd Edition

1.3 ACTION SUBMITTALS

.1 Submittals shall be in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

.1 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details, screw sizes and spacing, and anchors.

.2 Indicate locations, dimensions, openings and requirements of related work.

.3 Indicate welds by welding symbols as defined in CSA W59.

.4 Delegated Design: all secondary structure, including steel stud assemblies per this Section.

.1 Ensure shop drawings are stamped and signed by a qualified professional engineer licensed in Alberta.

.2 Submit Letter of Commitment, signed and sealed by professional engineer responsible for work of this Section; professional engineer shall define applicable responsible is in the completed Letter of Commitment and Letter of Compliance in compliance with the intent of the Building Code. Submit n conjunction with Shop Drawings.

.3 Submit Letter of Compliance, signed and sealed by professional engineer responsible for work of this Section. Design engineer to certify substantial compliance with the system design before the declaration of Substantial Performance for the project.

.3 Sustainable Design Submittals:

.2 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.3 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.4 Documentation must address 100% of ingredients.

.5 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as “mixture” are not acceptable.

.1 Each components of a mixture shall be identified.

.6 Provide documentation as required for LEED Submittals:

.2 MR Credit 4 – Recycled Content

.3 MR Credit 5 – Regional Materials

1.4 DELIVERY, STORAGE AND HANDLING

.1 Protect steel studs during transportation, site storage and installation in accordance with CSSBI Sheet Steel Facts #3.

.2 Handle and protect galvanized materials from damage to zinc coating.

.3 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan and as directed by Construction Manager.

.4 Ensure emptied containers are sealed and stored safely.

.5 Divert unused metal and materials from landfill to metal recycling facility as approved by Construction Manager.

.6 Fold up metal and plastic banding, flatten and place in designated area for recycling

Part 2 Products

2.1 MATERIALS

.1 Steel: to CSA S136, fabricated from ASTM A653/A653M, Grade A to D steel.

.2 Zinc coated steel sheet: quality to A653M, with Z275 designation zinc coating.

.3 Welding materials: to CSAW59 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 6.35 mm.

.5 Anchors: concrete expansion anchors or other suitable drilled type fasteners.

.6 Bolts, nuts, washers: hot dipped galvanized to CAN/CSA-G164, 600 g/m2 zinc coating.

.7 Touch up primer: zinc rich, to CAN/CGSB 1-GP-181.

2.2 STEEL STUD DESIGNATIONS

.1 Colour code steel studs in accordance with CSSBI Lightweight Steel Framing Manual.

2.3 METAL FRAMING

.1 Steel studs: to CSA S136, fabricated from zinc coated steel, depth as indicated. Minimum steel thickness as indicated on shop drawings.

.2 Stud tracks: fabricated from same material and finish as steel studs, depth to suit.

.1 Bottom track: single piece.

.2 Top track two-piece telescoping.

.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 38mm x depth of steel stud, minimum thickness as indicated on shop drawings.

.5 Tension straps and accessories: as recommended by manufacturer.

2.4 SOURCE QUALITY CONTROL

.1 Prior to commencement of work, submit:

.1 Two certified copies of mill reports covering material properties.

Part 3 Execution

3.1 GENERAL

.1 Do welding in accordance with CSA W59.

.2 Companies to be certified under Division 01 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

.3 Do work in accordance with CSSBI 52M.

3.2 ERECTION

.1 Erect components to requirements of reviewed shop drawings.

.2 Anchor tracks securely to structure at 800 mm o/c maximum, unless lesser spacing prescribed on shop drawings.

.3 Erect studs plumb, aligned and securely attached with two screws minimum, or welded in accordance with manufacturer's recommendations.

.4 Seat studs into bottom tracks and two-piece telescoping top track.

.5 Install 50.0 mm minimum telescoping track at top of walls where required to accommodate vertical deflection. Nest top track into deflection channel a minimum of 30.0 mm and a maximum of 40.0 mm. Do not fasten tracks together. Stagger joints.

.6 Install studs at not more than 50.0 mm from abutting walls, openings, and each side of corners and terminations with dissimilar materials.

.7 Brace steel studs with horizontal internal bridging at 1500 mm maximum. Fasten bridging to steel clips fastened to steel studs with screws or by welding.

.8 Frame openings in stud walls to adequately carry loads by use of additional framing members and bracing as detailed on shop drawings.

.9 Touch up welds with coat of zinc rich primer.

3.3 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 3.0 mm from design spacing.

.4 Gap between end of stud and track web: not more than 4.0 mm.

3.4 CUTOUTS

.1 Maximum size of cut-outs for services as follows:

Member Depth	Across Member Depth	Along Member Length	Centre to Centre Spacing (mm)
92	40 max.	105 max.	600 min.
102	40 max.	105 max.	600 min.
152	65 max.	115 max.	600 min.

.2 Limit distance from centerline of last unreinforced cut-out to end of member to less than 300 mm.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Supply, fabrication, and erection of miscellaneous metals as shown on the Drawings and described in this Specification

.2 Galvanizing of miscellaneous metal.

.2 Related Sections:

.1 Section 05 12 00 – Structural Steel

.2 Section 05 41 00 – Wind-Loading Bearing Steel Stud Systems

.3 Section 06 11 00 – Wall Framing

.4 Section 06 40 00 – Architectural Woodwork

.5 Section 09 21 16 – Gypsum Board Assemblies

.6 Section 09 77 53 – Vegetated Wall System

.7 Section 09 90 00 – Painting and Coating

.8 Structural Drawings: structural steel

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A269-10, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.3 ASTM A276, Standard Specification for Stainless Steel Bars and Shapes.

.4 ASTM A307-10, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.5 ASTM A653/A653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.

.2 CAN/CGSB-1.181-99, Ready-Mixed, Organic Zinc-Rich Coating.

.3 Canada Green Building Council (CaGBC)

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

.4 Canadian Standards Association (CSA International)

.1 CAN/CSA-G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA-S16-09, Design of Steel Structures, Includes Update No. 1 (2010).

.4 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel, Includes Update No. 3 (2011).

.5 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.

.6 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).

.5 The Environmental Choice Program

.1 CCD-047a-98, Paints, Surface Coatings.

.2 CCD-048-98, Surface Coatings - Recycled Water-borne.

.6 National Association of Architectural Metal Manufactures (NAAMM)

.1 NAAMM AMP 555-92, Code of Standard Practice for the Architectural Metal Industry.

1.3 SUBMITTALS

.1 Submittals shall be accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Non-slip aggregate surface finishes,

.2 Fasteners,

.3 Prefabricated components, and,

.4 Paint and coating products.

.3 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

.4 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Documentation must address 100% of ingredients.

.4 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as “mixture” are not acceptable.

.1 Each components of a mixture shall be identified.

.5 Provide documentation as required for LEED Submittals:

.1 MR Credit 4 – Recycled Content.

.2 MR Credit 5 – Regional Materials.

.3 IEQ Credit 4.1 – Low-Emitting Materials: Adhesives and Sealants.

.4 IEQ Credit 4.2 – Low-Emitting Materials: Painting and Coatings.

1.4 QUALITY ASSURANCE

.1 Detail and fabricate metal fabrications in accordance with the NAAMM AMP 555.

.2 Perform Work to the highest standard of modern shop and field practice, by personnel experienced in this Work. Accurately fit joints and intersecting members in true planes with adequate fastening. Build and erect the Work plumb, true, square, straight, level, accurate to the sizes shown, and free from distortion or defects.

.3 Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

.4 Welding: Qualify procedures and personnel according to the following:

.1 Welders shall be qualified by Canadian Welding Bureau for classification of work being performed.

.2 The fabricator shall be certified to CSA W47.1, Division 1 or 2.1.

.3 Do welding inspection to CSA W178.

.4 Resistance welding: to CSA W55.3.

.5 Fusion welding: to CSA W59.

1.5 SITE CONDITIONS

.1 Coordinate this Work with the remainder of the Work and exercise the necessary scheduling to ensure that all Work is carried out and all items incorporated during the appropriate construction phase.

.2 Provide instructions and drawings to other trades for setting bearing plates, anchors blots, and other members that are built in to work of other trades.

.3 Protect other sections of the work from damage by this section of the work.

Part 2 Products

2.1 MATERIALS

.1 Steel Materials:

.1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W.

.2 Hollow Structural Sections: In accordance with CAN/CSA G40.20/G40.21, Grade 350W, Class C.

.2 Steel pipe: to ASTM A53/A53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads, finish as indicated on Drawings.

.3 Welding materials: to CSA W59.

.4 Welding electrodes: to CSA W48 Series.

.5 Bolts and anchor bolts: to ASTM A307.

.6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

.7 High strength bolts: to ASTM A325M.

.8 Aluminum Extrusions: ASTM B221/B221M, alloy 6063-T6.

.9 Stainless Steel: to ASTM A276.

.2 Exit Stair Handrail Materials:

.1 Rail and Supports: steel; tubes, shapes and dimensions as indicated on Drawings,

.2 Finish: PT-1

.3 Mounting hardware and accessories: as specified by manufacturer.

.3 Pipe Rail Fence (roof):

.1 Construct balusters and handrails from steel pipe.

.2 Cap and weld exposed ends of balusters and handrails.

.3 Terminate at abutting wall with end flange.

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

.5 Where work of other Sections is attached to work of this section, prepare work by drilling and tapping holes as required facilitating installation of such work.

.4 Sprinkler Enclosure Cage:

.1 Material: aluminum

.2 Wire diameter: 4.0 mm

.3 Mesh size: 50 mm – 100 mm

.4 Posts: 50 mm pipe, schedule 40, straight. Include anchor bar, 10 mm.

.5 Beam post: 38 mm pipe, schedule 40, include rail end welded, 5 mm thick

.6 Hinges: structurally capable of supporting gate leaf and allow opening and closing with binding. Non-lift-off type hinge design shall permit gate to swing 180°.

.7 Latch: type to retain gate in closed position and have provision for padlock.

.5 Bollards:

.1 200 mm o.d. x 5 mm wall thickness, Schedule 40 steel tube post.

.2 Posts: 2440 mm long

.3 Finish: RAL 7045, Telegray 1.

2.2 MISCELLANEOUS ACCESSORIES

.1 Protective film: Treated paper or clear plastic, self-adhesive release type as recommended by Architectural metal fabricator, to protect finished metals. Film to be easily removable without damaging finished surfaces.

.2 Sealants: Specified under Section 07 92 00.

.3 Reinforcing bars: Conform to CAN3-G30.16-M1977, Grade 400, weldable.

.4 Bolts: Conform to ASTM A307.

.5 Headed concrete anchors: From steel conforming to ASTM A108, sizes as required:

Minimum tensile stress	414 MPa (60 ksi)
Minimum yield stress	345 MPa (40 ksi)
Minimum elongation - 50 mm (2")	20%
Acceptable manufacturers:	Nelson, Erico

.6 Adhesives: High pressure bonding type, suitable for materials being bonded. Contact adhesives not acceptable.

2.3 FABRICATION

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

.2 Use self-tapping shake-proof flat, round, or oval headed screws on items requiring assembly by screws or as indicated.

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

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

.5 Welding is to conform to CSA W59 and the fabricator certified to CSA W47.1. Include for welding inspection in the Contract.

.6 File or grind all exposed welds smooth and flush. Repair or fill all pits, cracks and holes. Grind and polish all handrails to a smooth, even surface. Smooth all inside corners, returns.

.7 Insulate when necessary to prevent electrolysis due to metal to metal contact or metal to masonry or concrete contact. Use bituminous paint or other approved method.

.8 Provide fastenings, including anchor bolts, bolts, lag screws, expansion bolts, straps, brackets, etc. required for the fabrication and erection of work of this section.

.9 Exterior site work, unless otherwise indicated, to have hot dip galvanized finish.

2.4 FABRICATION, STEEL RAILING SYSTEM

.1 Fit and shop assemble components in largest practical sizes for delivery to site.

.2 Fabricate components with joints tightly fitted and secured.

.3 Provide anchors, plates, and angles required for connecting railings to structure.

.4 Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

.5 Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.

.6 Interior Components: Continuously seal joined pieces by continuous welds.

.7 Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

.8 Accurately form components to suit stairs and landings, to each other and to building structure.

.9 Accommodate for expansion and contraction of members and building movement without damage to connections or members.

2.5 FINISHES

.1 Hot dip galvanizing: galvanize steel, where indicated, to ASTM A123, minimum zinc coating of 600 g/m².

.2 Shop coat primer: to CAN/CGSB-1.40.

.3 Touch up galvanized surfaces with zinc rich coating to CGSB 1.181.

.4 Isolation Coating: Apply an isolation coating to contact surfaces in contact with cementitious materials, wood materials and dissimilar metals except stainless steel.

.5 Paint: Prepare the Work and paint in accordance with CAN/CSA-S16, primed ready for Work Site finish as specified in Section 09 90 00 – Painting and Coatings. Leave surfaces to be welded unpainted.

.1 Exposed metal shall be painted PT-1 unless indicated otherwise.

Part 3 Execution

3.1 ERECTION

.1 Install Work in accordance with manufacturer's/fabricator's written instructions and Contract Documents.

.2 Do welding work in accordance with CSA W59 unless specified otherwise.

.3 Supply finished items to be built-in to those trades along with instructions for proper installation.

.4 Apply architectural metal work using hidden mechanical fasteners. Installation shall be by skilled Architectural metal workers experienced in highest quality work.

.5 Fasteners to draw adjoining sections together in proper, true alignment, and are capable of field adjustment.

.6 All fasteners, mountings to be non-loosening and installed so that they will be hidden at completion.

.7 Install all Work to true, straight lines, accurate to profile, all properly aligned.

.8 Isolate dissimilar metals in a manner approved by the Consultant to prevent electrolytic action or corrosion.

.9 Install finish hardware supplied under other sections required for completion of components of this section.

.10 Erect metal work square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

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

.12 Make field connections with high tensile bolts to CSA-S16.1 and weld to prevent loosening.

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

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

.15 Repair galvanized areas damaged by welding, flame cutting or during handling, transport or erection in accordance with ASTM A780. Touch-up with organic zinc-rich paint to CGSB 1.181, complying with Section 09 90 00 – Painting and Coatings.

3.2 FASTENINGS

.1 Provide fastenings, including anchor bolts, bolts, lag screws, expansion bolts, straps, brackets, etc. required for the fabrication and erection of this Section.

.2 Use exposed fastenings and accessories of the same material, colour and finish as the base metal.

.3 Keep exposed fastenings to a minimum and space evenly.

.4 Use only permanent type fastenings; do not use wood or organic plugs.

3.3 WELDING

.1 All welding shall be done by the shielded metal-arc method in accordance with the requirements CSA W59. The welding operators shall have passed within the preceding six (6) months, the qualification test as set forth in CSA W47.1

.2 Submit welding procedures prepared and sealed by a Professional Engineer registered in the Province of Alberta familiar with this discipline to the Engineer for his examination and comments.

.3 Surfaces shall be free from loose scale, rust, paint, or other foreign matter. Where weld material is deposited in two or more layers, each layer shall be cleaned before the next layer is deposited. Care shall be taken to minimize stresses due to heat expansion, contraction and distortion by using proper sequence in welding and by approved methods.

.4 Welding consumables for processes shall be fully approved by Canadian Welding Bureau and certified by the manufacturers as complying with requirements of this specification. Such certificates shall be no more than two years old.

.5 Electrode strengths to be equal to E70xx or better.

.6 Finish exposed welding to provide the best possible visual appearance to the satisfaction of the Engineer.

3.4 SPRINKLER ENCLOSURE CAGE

.1 Install chain link fence system in accordance with manufacturer's instructions.

.2 Locate terminal post at each fence termination and change in horizontal or vertical direction of 30° or more.

.3 Space line posts uniformly

.4 Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.

.5 Bracing: Install horizontal brace and truss assembly at mid-height or above for fences 1829 mm. The diagonal truss rod is installed at the point where the brace rail is attached to the terminal post and diagonally down to the bottom of the adjacent line post. Place the truss rod in tension by adjusting the turnbuckle.

.6 Top rail: Connect ends with sleeves forming a rigid connection, allow for expansion and contraction.

.7 Center Rails: Install mid rails between line posts and attach to post using rail end or line rail clamp.

.8 Bottom Rail: Install bottom rails between posts and attach to post using rail end or line rail clamp.

.9 Swing gates: Direction of swing shall be as shown on drawings. Gates shall be hung plumb in the closed position with minimal space from grade to bottom of gate leaf. Gate leaf holdbacks shall be installed on all double gates and all gate leafs greater than 1524 mm in width.

3.5 BOLLARDS

.1 Install where 200 mm diameter guard posts are shown. Fill with concrete and form rounded top.

.2 Bolt in concrete on grade with anchors as shown on Drawings. Coordinate with Section 03 30 00 – Cast-In-Place Concrete.

3.6 MISCELLANEOUS ITEMS

.1 Install:

.1 Steel angle frame, hanging rods and bracing for supporting bulkheads and shelving.

.2 Bracket backing supports for vanities.

.3 Sheet steel support bracket on cabinet work. 0.912 mm (20 ga.) metal core thickness.

.4 Sheet steel backing as indicated in Drawings. 0.912 mm (20 ga.) metal core thickness.

.5 Exterior steel channel framing as detailed on the drawings complete with all connections and anchors.

.6 Steel framing as detailed.

.7 All other items as indicated on Drawings.

3.7 PROTECTION

.1 Protect completed Work from damage during and after installation.

.2 Protective covering to remain on Architectural metal work installed under this Section until just before Consultant's inspection.

.3 Any Architectural metal work of this Section damaged or having finish marred or discoloured in any way shall be rejected and shall be removed from the site immediately and replaced with new at no cost to the Consultant or Owner.

.4 Field repair or refinishing of damaged, marred or discoloured finishes will not be accepted.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Structural floor, wall, and roof framing.

.2 Floor, wall, and roof sheathing.

.3 Preservative treatment of wood.

.4 Fire retardant treatment of wood.

.5 Miscellaneous framing and sheathing.

.6 Connection hardware.

1.2 RELATED SECTIONS

.1 Section 01 35 60 - Sustainable Certification Requirements and Submittals.

.2 Section 03 30 00 - Cast-in-Place Concrete.

1.3 REFERENCES

.1 APA AFG-01 - Adhesives for Field-Gluing Plywood to Wood Framing.

.2 ASME B18.2.1-2010 - Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws.

.3 ASME B18.6.1-1981 (R2008) - Wood Screws.

.4 ASTM A153/A153M-09 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.5 ASTM A307-12 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.6 ASTM A563-07a - Standard Specification for Carbon and Alloy Steel Nuts.

.7 ASTM A653/A653M-11 - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.

.8 ASTM C954-11 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84mm) to 0.112 in (2.84mm) in Thickness.

.9 ASTM D2898-10 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.

.10 ASTM D3201-08ae1 - Standard Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products.

.11 ASTM D3498-03(2011) - Standard Specification for Adhesives for Field Gluing Plywood to Lumber Framing for Floor Systems.

.12 ASTM D5516-09 - Standard Test Method for Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to Elevated Temperatures.

.13 ASTM D5664-10 - Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber.

.14 ASTM D6305-08 - Standard Practice for Calculating Bending Strength Design Adjustment Factors for Fire-Retardant Treated Plywood Roof Sheathing.

.15 ASTM D6841-08 - Standard Practice for Calculating Design Value Treatment Adjustment Factors for Fire-Retardant Treated Lumber.

.16 ASTM E84-12c - Standard Test Method for Surface Burning Characteristics of Building Materials.

.17 ASTM E488/E488M-10 - Standard Test Methods for Strength of Anchors in Concrete Elements.

.18 AWPA M4-06 - Standard for the Care of Preservative-Treated Wood Products.

.19 CANPLY (Canadian Plywood Association) - Grading and certification.

.20 CSA B111-1974 (R2003) - Wire Nails, Spikes and Staples.

.21 CSA G40.20-04/G40.21-04 (R2009) - General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.

.22 CSA O80 Series 08 Wood Preservation.

.23 CSA O86-09 - Engineering Design in Wood.

.24 CSA O121-08 - Douglas Fir Plywood.

.25 CSA O141-05 - Softwood Lumber.

.26 ICC-ES ESR-1539 - Power-Driven Staples and Nails.

.27 NLGA (National Lumber Grades Authority) - Standard Grading Rules for Canadian Lumber, 2007 Edition.

.28 Alberta Building Code 2006 (including Part 9).

.29 For Projects overseen by a Construction Manager in lieu of a General Contractor, references to “Contractor” shall apply to the relevant Subcontractor(s).

1.4 SUBMITTALS

.1 Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

.1 Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include treatment manufacturer’s written instructions for handling, storing, installing, and finishing treated material.

.2 Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

.3 For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.

.4 For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

.5 Include copies of warranties from chemical treatment manufacturers for each type of treatment.

.6 For connectors, include installation instructions.

.2 Samples of Exposed To View Wood Members: Submit one sample of each different type, minimum 300mm in size, illustrating wood grain, stain, and finish.

.3 Certificates of Conformance: In lieu of grade stamping lumber and plywood exposed to view, submit manufacturer's certificate certifying that products meet or exceed specified requirements.

.4 Weather Protection: Provide letter outlining steps to be taken during construction to ensure adequate weather protection of wood structures.

.5 Sustainable Design: Per Section 01 35 60 - Sustainable Certification Requirements and Submittals.

.1 Submit Regional Materials/Recycled Content Statement for lumber and plywood.

.2 Submit Urea-Formaldehyde Free Statement for all plywood used on the inside of the building.

1.5 QUALITY ASSURANCE

.1 Perform Work in accordance with CSA O86 and the following agencies:

.1 Lumber Grading Agency: Certified by NLGA.

.2 Plywood Grading Agency: Certified by CANPLY.

.2 Installer Qualifications: Company specializing in performing the Work of this Section with minimum three years of experience.

1.6 DELIVERY, STORAGE, AND PROTECTION

.1 Protect materials from weather during transit to Project site.

.2 Stack materials flat with spacers beneath and between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

Part 2 Products

2.1 SUSTAINABLE DESIGN

.1 Refer to Section 01 35 60 for sustainable design requirements.

.2 All lumber and related accessories to comply with materials radius as per Living Building Challenge.

2.2 DIMENSION LUMBER FRAMING

.1 Lumber Grading Rules: NLGA. All softwood lumber shall conform to CSA O141 and CSA O86.

.2 Identification: Factory mark each piece of lumber with grade stamp of grading agency. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece. Deliver to site with certificates as to species, grades, stress grades, seasoning, moisture content, and other evidence as required to show compliance with the Specifications.

.3 Maximum Moisture Content: 19% unless noted otherwise.

.4 Studs, Joists, Built-up Posts, Built-up Beams, Nailers, and Blocking: SPF #2 or better unless noted otherwise, S4S.

.5 Top and Bottom Plates: D.Fir-L #2 or better.

.6 Strapping and Nailing Strips: Hem-Fir, Construction Grade, unless noted otherwise.

.7 Solid Wood Posts and Beams: D.Fir-L #1 or better.

2.3 SHEATHING

.1 Floor Sheathing: T&G Douglas Fir plywood, exterior grade, conforming to CSA O121. Thickness as indicated, not less than 13mm.

.2 Roof Sheathing: Douglas Fir plywood, exterior grade, conforming to CSA O121. Thickness as indicated, not less than 13mm. Provide H-clips between each joist for 13mm panels; provide T&G edge for 16mm and thicker panels.

.3 Wall Sheathing: Douglas Fir plywood, exterior grade, conforming to CSA O121. Thickness as indicated, not less than 13mm.

.4 Identification: Factory mark panels to indicate compliance with applicable standard.

2.4 WOOD-PRESERVATIVE-TREATED MATERIALS

.1 Wood Preservative (Pressure Treatment): CSA O80 Series.

.2 Wood Preservative (Surface Application): CSA O80 Series treated by immersion (not by brush).

.3 Oil Borne Preservatives: Material treated using oil borne preservatives shall be subjected to a vacuum expansion bath at a treatment plant according to CSA O80 Series to produce a material that is free of excessive surface oil

.4 Water Borne Preservatives: Material treated using water borne preservatives shall have an average moisture content not exceeding 25% at 25mm depth below the surface prior to preservative treatment.

.5 Moisture Content: Following treatment, dry material to maximum moisture content of 19% unless noted otherwise.

.6 Identification: Identify preservative-treated wood with certification mark authorized by the Canadian Wood Preservers Bureau (CWPB).

.7 Application: Treat items indicated on the Drawings, and the following:

.1 Wood cants, nailers, curbs, equipment support bases, blocking, stripping, sheathing, and similar members in connection with roofing, flashing, vapour barriers, and waterproofing.

.2 Wood sills, sleepers, blocking, furring, stripping, sheathing, and similar concealed members in contact with masonry or concrete.

.3 Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.

.4 Wood members that are less than 450mm above the ground in crawl spaces or unexcavated areas.

.5 Wood floor plates that are installed over concrete slabs on grade.

2.5 FIRE-RETARDANT-TREATED MATERIALS

.1 General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

.2 Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 3.2 meters beyond the centerline of the burners at any time during the test.

.1 Use treatment that does not promote corrosion of metal fasteners.

.2 Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.

.3 Interior Type A: Treated materials shall have a moisture content of 28% or less when tested according to ASTM D3201 at 92% relative humidity. Use where exterior type is not indicated.

.3 Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D5664 and design value adjustment factors shall be calculated according to ASTM D6841. Treated plywood shall be tested according to ASTM D5516 and design value adjustment factors shall be calculated according to ASTM D6305.

.4 Moisture Content: Kiln-dry lumber after treatment to a maximum moisture content of 19%. Kiln-dry plywood after treatment to a maximum moisture content of 15%. Do not use material that is warped or does not comply with requirements for untreated material.

.5 Identification: Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency. For exposed items indicated to receive a stained or natural finish, mark end or back of each piece, or omit marking and provide certificates of treatment compliance issued by testing agency.

.6 For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

2.6 MISCELLANEOUS LUMBER

.1 General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

.1 Rooftop equipment bases and support curbs.

.2 Cants.

.3 Furring.

.4 Grounds.

.5 Plywood backing.

.2 For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.

2.7 FASTENERS

.1 General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153 or of Type 304 stainless steel.

.2 Nails, Spikes, and Staples: CSA B111.

.3 Power-Driven Fasteners: ICC-ES ESR-1539.

.4 Lag Screws: ASME B18.2.1

.1 All lag screws to be machined threaded, not cast threaded.

.2 Pre-drilled hole sizes in wood members for lag screws to be in accordance with CSA O86.

.5 Wood Screws: ASME B18.6.1.

.6 Timber Rivets and Steel Side Plates: CSA O86.

.7 Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

.8 Bolts and Anchor Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers, hot dip galvanized to ASTM A153.

.9 Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E488 conducted by a qualified independent testing and inspecting agency.

2.8 METAL FRAMING ANCHORS

.1 General: Use galvanized Simpson Strong-Tie connectors or approved equal where required.

.2 Factored Design Loads: Provide products with factored design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

.3 Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653, Z180 (G60) coating designation. Use for interior locations unless noted otherwise.

.4 Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); Z550 (G185) coating designation; and not less than 0.91 mm thick. Use for wood-preservative-treated lumber and where indicated.

.5 Steel Plate: CSA G40.20/G40.21, Grade 300W. Use where indicated.

.6 Joist Hangers: U-shaped joist hangers with 50mm long seat and 32mm wide nailing flanges at least 85% of joist depth, minimum capacity 4.5 kN.

.7 Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.

.1 Strap Width: 38mm.

.2 Thickness: 1.3mm.

.8 Bridging: Rigid, V-section, nailless type, 1.3mm thick, length to suit joist size and spacing.

.9 Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 25mm above base and with 50mm minimum side cover, socket 1.6mm thick, and standoff and adjustment plates 2.8mm thick.

.10 Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.

.1 Width: 32mm.

.2 Thickness: 1.3mm.

.3 Length: 600mm.

.11 Rafter Tie-Downs: Bent strap tie for fastening rafters to wall studs below, 38mm wide by 1.3mm thick.

.12 Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters to wall studs below, 57mm wide by 1.6mm thick. Tie fits over top of rafter and fastens to both sides of rafter or truss, face of top plates, and side of stud below.

.13 Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 32mm wide x 1.3mm thick x 900mm long.

.14 Hold-Downs: As indicated on the Drawings.

2.9 MISCELLANEOUS MATERIALS

.1 Sill-Sealer Gaskets: Closed-cell neoprene foam, 6.4mm thick, selected from manufacturer's standard widths to suit width of sill members indicated.

.2 Adhesives for Field Gluing Panels to Framing: ASTM D3498 or APA AFG-01, approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

Part 3 Execution

3.1 EXAMINATION

.1 Examine substrates in areas to receive wood framing, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION - GENERAL

.1 Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

.2 Framing Standard: Comply with Part 9 of the Alberta Building Code 2006 unless noted otherwise.

.3 Provide temporary shores, guys, braces, and other supports during erection to keep wood framing secure, plumb, and in alignment against wind loads, seismic loads, temporary construction loads, and loads equal in intensity to design loads. Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Installer.

.4 Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

.5 Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

.6 Install sill sealer gasket to form continuous seal between sill plates and foundation walls. At all other locations where wood framing abuts concrete or masonry construction, provide moisture barrier as indicated. Acceptable barriers include light gauge metal, asphalt-impregnated building paper, closed-cell foam gasket material, saturated felt roll roofing, or 0.1mm thick polyethylene.

.7 Do not splice structural members between supports unless noted otherwise.

.8 Built-Up Columns: Where Drawings indicate compression members consisting of multiple laminations, fasten laminations in accordance with CSA O86.

.9 Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 400mm o.c.

.10 Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

.11 Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

.1 Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 2400mm o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.

.2 Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 2400mm o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 50mm nominal (38mm actual) thickness.

.3 Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 9.3 sq.m and to solidly fill space below partitions.

.4 Fire block concealed spaces behind combustible cornices and exterior trim at not more than 6000mm o.c.

.12 Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

.13 Comply with AWPA M4 and revisions specified in CSA O80 Series, Supplementary Requirements to AWPA M2 for applying field treatment to cut surfaces of preservative-treated lumber.

.1 Use inorganic boron for items that are continuously protected from liquid water.

.2 Use copper naphthenate for items not continuously protected from liquid water.

.3 Use two coats of specified preservative to all fresh cuts or holes.

.14 Securely attach to substrate by anchoring and fastening as indicated, complying with the following:

.1 ICC-ES ESR-1539 for power-driven fasteners.

.2 Table 9.23.3.4, "Nailing for Framing," in Part 9 of the Alberta Building Code 2006.

.15 Use common steel wire nails unless noted otherwise. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless noted otherwise.

.16 Substitution of common nails with power-driven nails of the same length and diameter is acceptable. Substitution of power-driven nails of smaller diameter is permitted only with the Consultant's approval.

.17 For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

.1 Comply with approved fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.

.2 Use finishing nails unless noted otherwise. Countersink nail heads and fill holes with wood filler.

3.3 WALL AND PARTITION FRAMING INSTALLATION

.1 General: Provide single bottom plate and double top plates using members of 38mm actual thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs.

.1 Fasten plates to supporting construction unless noted otherwise.

.2 Provide continuous horizontal blocking at midheight of partitions more than 2400mm high, using members of 38mm actual thickness and of same width as wall or partitions.

.2 Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.

.3 Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs. Space short studs over and under opening to stud spacing.

.1 For non-load-bearing partitions, provide double-jamb studs and headers not less than 89mm actual depth for openings 1200mm and less in width, 140mm actual depth for openings 1200mm to 1800mm in width, 184mm actual depth for openings 1800mm to 3000mm in width, and not less than 235mm actual depth for openings 3000mm to 3600mm in width.

.2 For load-bearing walls, provide double-jamb studs for openings 1.5m and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated or, if not indicated, according to Tables A-12 to A-16 in Part 9 of the Alberta Building Code 2006.

.4 Laminate studs solid beneath all beam ends and carry through to concrete foundation below. Unless noted otherwise, built-up studs shall match number of laminations in built-up member being supported. Fully block all joist spaces below point loads. Take care to ensure beams bear fully on supporting members.

3.4 FLOOR JOIST FRAMING INSTALLATION

.1 General: Install floor joists with crown edge up and support ends of each member with not less than 38mm of bearing on wood or metal, or 75mm on masonry. Attach floor joists as follows:

.1 Where supported on wood members, by toe nailing or by using metal framing anchors.

.2 Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.

.2 Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 1200mm.

.3 Do not notch in middle third of joists. Limit notches to 1/6 depth of joist, 1/3 at ends. Do not bore holes larger than 1/3 depth of joist. Do not locate holes closer than 50mm from top or bottom.

.4 Provide solid blocking of 38mm actual thickness by depth of joist at ends of joists unless nailed to header or band.

.5 Lap members framing from opposite sides of beams, girders, or partitions not less than 100mm or securely tie opposing members together. Provide solid blocking of 38mm actual thickness by depth of joist over supports.

.6 Anchor members paralleling masonry with 6.4mm x 32mm metal strap anchors spaced not more than 2400mm o.c., extending over and fastening to three joists. Embed anchors at least 100mm into grouted masonry with ends bent at right angles and extending 100mm beyond bend.

.7 Provide solid blocking between joists under jamb studs for openings.

.8 Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.

.9 Provide solid blocking or bridging of either type indicated below, at intervals of 2100mm o.c., between joists spanning more than 3000mm.

.1 Diagonal wood bridging formed from bevel-cut, 19mm x 64mm actual size lumber, double-crossed and nailed at both ends to joists.

.2 Steel bridging installed to comply with bridging manufacturer's written instructions.

3.5 CEILING JOIST AND RAFTER FRAMING INSTALLATION

.1 Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 19mm x 184mm or 38mm x 89mm actual size stringers spaced 1200mm o.c. crosswise over main ceiling joists.

.2 Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

.1 At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 50mm deeper. Bevel ends of jack rafters for full bearing against valley rafters.

.2 At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 50mm deeper. Bevel ends of jack rafters for full bearing against hip rafter.

.3 Provide collar beams (ties) as indicated or, if not indicated, provide 19mm x 140mm actual size boards between every third pair of rafters, but not more than 1200mm o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.

.4 Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.6 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

.1 Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

.2 Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless noted otherwise.

.3 Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

.4 Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 38mm wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.7 WOOD FURRING INSTALLATION

.1 Install furring as required, whether indicated or not, where services, piping, ductwork, and other items project or become visible through finished surfaces.

.2 Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

.3 Furring to Receive Plywood or Hardboard Paneling: Install 19mm x 63mm actual size furring horizontally and vertically at 600mm o.c.

.4 Furring to Receive Gypsum Board or Plaster Lath: Install 19mm x 38mm actual size furring vertically at 400mm o.c.

.5 Finish surface of furring to match surrounding materials.

3.8 SHEATHING INSTALLATION

.1 Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

.2 Secure floor and roof sheathing with longer edge perpendicular to framing members and with end joints staggered and sheet ends over bearing.

.3 Fully engage tongue and groove edges where applicable. Where sheathing is not T&G, use sheathing clips between sheets.

.4 Secure wall sheathing to wall studs, with ends over firm bearing and staggered. Long dimension of sheathing may be parallel or perpendicular to wall studs.

.5 Cut panels at penetrations, edges, and other obstructions of work. Fit tightly against abutting construction unless noted otherwise.

.6 Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

.7 Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the work day when rain is forecast.

3.9 ADDITIONAL ITEMS

.1 Make allowance for, provide, and install items such as blocking, bracing, backing, infill pieces, fasteners, furring, grounds, shims, bucks, dowels, bolts, washers, and other hardware. Provide such additional items, whether indicated or not, as required for strength and against movement and deflection, as directed by the Consultant or Architect, and as required by the applicable building codes and bylaws.

.2 No additional funds will be paid to the Contractor to provide such items to complete the Project as intended.

3.10 ERECTION TOLERANCES

.1 Overall Squareness: For rectangular floor areas, the corner-to-corner diagonal measurements should not deviate from each other by more than 13mm or 0.25% of the length of the shortest side of the rectangle, whichever is greater.

.2 Posts:

.1 Plumbness: 0.25% of post height (1:400) maximum deviation from plumb.

.2 Position: plus or minus 10mm from theoretical at base in both directions.

.3 Walls:

.1 Plumbness: 0.25% of wall height (1:400) maximum deviation from plumb measured at any point along the wall.

.2 Position: plus or minus 10mm from theoretical at base.

.3 Length: plus or minus 10mm from theoretical.

.4 Stud Spacing: plus or minus 16mm from specified.

.4 Floors and Roofs:

.1 Overall Surface Levelness (Floors and Flat Roofs): 6mm in 3 meters maximum measured at any two points.

.2 Individual Joist Levelness (Floors and Flat Roofs): 6mm in 3 meters maximum.

.3 Elevation: plus or minus 10mm from theoretical.

.4 Joist Spacing: plus or minus 16mm from specified.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Glued-laminated timber floor and roof panels.

.2 Connection hardware.

1.2 RELATED SECTIONS

.1 Section 01 35 00 - Delegate Design.

.2 Section 01 35 60 - Sustainable Certification Requirements and Submittals.

.3 Section 05 12 00 - Structural Steel.

.4 Section 06 11 00 - Wood Framing.

.5 Section 09 90 00 - Painting and Coatings.

1.3 REFERENCES

.1 CSA O86-09 - Engineering Design in Wood.

.2 CSA O112 Series-M1977 (R2006) - CSA Standards for Wood Adhesives.

.3 CSA O122-06 (R2011) - Structural Glued-Laminated Timber.

.4 CSA O177-06 (R2011) - Qualification Code for Manufacturers of Structural Glued-Laminated Timber.

.5 Alberta Building Code 2006.

.6 For Projects overseen by a Construction Manager in lieu of a General Contractor, references to “Contractor” shall apply to the relevant Subcontractor(s).

1.4 PERFORMANCE REQUIREMENTS

.1 Design all connections not detailed on the Drawings to CSA O86 unless noted otherwise.

.2 Design connections for the forces shown on the Drawings.

1.5 SUBMITTALS

.1 Product Data: For each type of product.

.1 Include data on lumber, adhesives, fabrication, and protection.

.2 For connectors, include installation instructions.

.2 Samples: For each Quality appearance grade panel, with shop-applied sealer, 600mm x 600mm.

.3 Shop Drawings: Show fabrication and erection of glued-laminated timber panels.

.1 Show layout, dimensions, and elevations of each panel.

.2 Clearly indicate species, stress grade, service grade, appearance grade, and shop applied finishes.

.3 Include details of cuts, holes, cambers, fastenings, and connection hardware.

.4 Connection Design Calculations: For connections indicated to comply with performance requirements, where requested. Calculations shall be signed and sealed by the qualified Professional Engineer responsible for their preparation, experienced in the design of this Work and licensed at the place where the Project is located.

.5 Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating that structural glued-laminated timber complies with the requirements in CSA O122.

.6 Weather Protection: Provide letter outlining steps to be taken during construction to ensure adequate weather protection of wood structures.

.7 Sustainable Design: Per Section 01 35 60 - Sustainable Certification Requirements and Submittals.

.1 Submit Regional Materials/Recycled Content Statement for lumber.

.2 Submit Urea-Formaldehyde Free Statement for all glulam used on the inside of the building.

1.6 QUALITY ASSURANCE

.1 Perform all Work in accordance with CSA O86.

.2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years of experience, and certified in accordance with CSA O177.

.3 Installer Qualifications: Company specializing in performing the Work of this section with minimum three years documented experience and approved by the manufacturer.

.4 Design connections not detailed on the Drawings under direct supervision of a Professional Engineer experienced in design of this Work and licensed at the place where the Project is located. Drawings of components designed by the manufacturer shall be signed and sealed by the Professional Engineer.

.5 The Professional Engineer sealing the fabricator's shop drawings is also responsible for all field review of his or her Work. The Engineer shall provide signed and sealed letters of assurance to the Consultant confirming the Work has been completed in accordance with the final reviewed shop drawings and all structural requirements.

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Individually wrap panels using plastic-coated paper covering with water-resistant seams.

.2 Store panels off the ground with spacer blocks so air may circulate around all faces of panels.

.3 Protect corners with wood blocking.

.4 Keep wrapping on the panels until permanent protection from the weather is in place, but slit underside to prevent accumulation of moisture inside the wrapping. Do not deface panels. Provide temporary sloping tarps as required to prevent accumulation of water on top of wrapped panels.

Part 2 Products

2.1 SUSTAINABLE DESIGN

.1 Refer to Section 01 35 60 for sustainable design requirements.

2.2 MATERIALS

.1 Laminating Stock: Douglas Fir or Spruce Pine #1/2 to CSA O122 unless noted otherwise, 38mm wide.

.2 Laminating Adhesive: CSA O112, to grade of service required in accordance with CSA O122, clear or white.

.3 Wood Sealer: Manufacturer's standard, transparent, colorless wood sealer that is compatible with indicated finish. End sealer shall be effective in retarding the transmission of moisture at cross-grain cuts.

.4 Fasteners and Metal Framing Anchors: As specified in Section 06 11 00. All fasteners and anchors shall be hot dip galvanized unless otherwise noted.

.5 Structural Steel Connectors: As specified in Section 05 12 00. All steel and connectors shall be hot dip galvanized unless noted otherwise.

.6 Wrapping Materials: Weatherproof, lightproof, stain-free material.

2.3 FABRICATION

.1 General: Fabricate panels to CSA O122 and to the following classifications unless noted otherwise on the Drawings:

.1 Service Grade: Exterior unless noted otherwise on the Drawings.

.2 Appearance Grade: Quality where exposed, Commercial where not exposed.

.2 Verify dimensions and site conditions prior to fabrication.

.3 Shop fabricate for connections to the greatest extent possible, including cutting to length. Dress exposed surfaces as needed to remove planing and surfacing marks.

.4 Mark panels for identification during erection. Ensure marks will be concealed in final assembly for appearance grade panels. Clearly mark top surface.

.5 Splices: Do not splice or join panels in locations other than those indicated without permission.

.6 End-Cut Sealing: Immediately after end cutting each panel to final length, apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces flood coated for not less than 10 minutes.

.7 Seal Coat: After fabricating, sanding, and end-coat sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each panel.

.8 End Caps: For all panels on the exterior of the building, provide a shop-applied 13mm thick end cap of matching wood material glued to the end face. Shop apply three coats of sealant to all sides and end caps of panels when exposed to rain or moisture.

.9 Steel: Fabricate steel hardware and connections with joints neatly fitted, welded, and ground smooth. Test fit in shop.

Part 3 Execution

3.1 EXAMINATION

.1 Examine substrates in areas to receive panels, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

.1 General: Erect panels in accordance with final reviewed shop drawings, and with uniform, close-fitting joints. Fit panels without trimming, cutting, or other modifications, unless approved in writing by the Consultant.

.2 Provide temporary shores, guys, braces, and other supports during erection to keep panels secure and in alignment against wind loads, seismic loads, temporary construction loads, and loads equal in intensity to design loads. Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Installer.

.3 Handle and temporarily support panels to prevent surface damage, compression, and other effects that might interfere with indicated finish.

.4 Install connectors as indicated.

.5 Provide moisture barrier at all locations where panels abut concrete or masonry construction. Acceptable barriers include light gauge metal, asphalt-impregnated building paper, closed-cell foam gasket material, saturated felt roll roofing, or 0.1mm thick polyethylene.

.6 Repair damaged surfaces and finishes after completing erection. Replace damaged panels if repairs are not approved by Architect.

.7 Site cutting or boring of panels, other than shown on shop drawings, is not permitted without written consent of Consultant.

3.3 PROTECTION

.1 Do not remove wrappings until they no longer serve a useful purpose, including protection from weather, sunlight, soiling, and damage from Work of other trades.

.2 Coordinate wrapping removal with finishing Work. Retain wrapping where it can serve as a painting shield.

.3 Slit underside of wrapping to prevent accumulation of moisture inside the wrapping. Do not deface panels.

3.4 ERECTION TOLERANCES

.1 Overall Squareness: For rectangular areas, the corner-to-corner diagonal measurements should not deviate from each other by more than 13mm or 0.25% of the length of the shortest side of the rectangle, whichever is greater.

.2 Overall Surface Levelness (Floors and Flat Roofs): 6mm in 3 meters maximum.

.3 Elevation: plus or minus 10mm from theoretical.

.4 Joints: 5mm maximum gap between panels unless noted otherwise.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Glued-laminated wood beams and columns.

.2 Preservative treatment of wood.

.3 Steel hardware and attachment brackets.

1.2 RELATED SECTIONS

.1 Section 01 35 00 - Delegated Design.

.2 Section 01 35 60 - Sustainable Certification Requirements and Submittals.

.3 Section 05 12 00 - Structural Steel.

.4 Section 06 11 00 - Wood Framing.

.5 Section 09 90 00 - Painting and Coatings.

1.3 REFERENCES

.1 ASTM A123/A123M-09 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A153/A153M-09 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.3 ASTM A307-12 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.4 ASTM A563-07a - Standard Specification for Carbon and Alloy Steel Nuts.

.5 CSA G40.20-04/G40.21-04 (R2009) - General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.

.6 CSA O80 Series□08 □Wood Preservation.

.7 CSA O86-09 - Engineering Design in Wood.

.8 CSA O112 Series-M1977 (R2006) - CSA Standards for Wood Adhesives.

.9 CSA O122-06 (R2011) - Structural Glued-Laminated Timber.

.10 CSA O177-06 (R2011) - Qualification Code for Manufacturers of Structural Glued-Laminated Timber.

.11 CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel.

.12 CSA W59-03 (R2008) - Welded Steel Construction (Metal Arc Welding).

.13 Alberta Building Code 2006.

.14 For Projects overseen by a Construction Manager in lieu of a General Contractor, references to “Contractor” shall apply to the relevant Subcontractor(s).

1.4 PERFORMANCE REQUIREMENTS

.1 Design all connections not detailed on the Drawings to CSA O86 unless noted otherwise.

.2 Design connections for the forces shown on the Drawings.

1.5 SUBMITTALS

.1 Product Data: For each type of product.

.1 Include data on lumber, adhesives, fabrication, and protection.

.2 For preservative-treated wood products, include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

.3 For connectors, include installation instructions.

.2 Shop Drawings: Show fabrication and erection of glued-laminated components.

.1 Show layout of structural glued-laminated timber system and full dimensions of each member.

.2 Clearly indicate species, stress grade, service grade, appearance grade, and shop applied finishes.

.3 Include details of cuts, holes, cambers, fastenings, and connection hardware.

.3 Connection Design Calculations: For connections indicated to comply with performance requirements, where requested. Calculations shall be signed and sealed by the qualified Professional Engineer responsible for their preparation, experienced in the design of this Work and licensed at the place where the Project is located.

.4 Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating that structural glued-laminated timber complies with the requirements in CSA O122.

.5 Weather Protection: Provide letter outlining steps to be taken during construction to ensure adequate weather protection of wood structures.

.6 Sustainable Design: Per Section 01 35 60 - Sustainable Certification Requirements and Submittals.

.1 Submit Regional Materials/Recycled Content Statement for lumber.

.2 Submit Urea-Formaldehyde Free Statement for all glulam used on the inside of the building.

1.6 QUALITY ASSURANCE

.1 Perform all Work in accordance with CSA O86.

.2 Welding:

.1 Perform welding Work in accordance with CSA W59.

.2 All welders employed on the Work must have passed the qualification test as set forth in CSA W47.1 within the preceding 12 months.

.3 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years of experience, and certified in accordance with CSA O177.

.4 Installer Qualifications: Company specializing in performing the Work of this section with minimum three years documented experience and approved by the manufacturer.

.5 Design connections not detailed on the Drawings under direct supervision of a Professional Engineer experienced in design of this Work and licensed at the place where the Project is located. Drawings of components designed by the manufacturer shall be signed and sealed by the Professional Engineer.

.6 The Professional Engineer sealing the fabricator's shop drawings is also responsible for all field review of his or her Work. The Engineer shall provide signed and sealed letters

of assurance to the Consultant confirming the Work has been completed in accordance with the final reviewed shop drawings and all structural requirements.

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Individually wrap members using plastic-coated paper covering with water-resistant seams.

.2 Store members off the ground with spacer blocks so air may circulate around all faces of members.

.3 Use padded, non-marring slings for handling glued-laminated members.

.4 Protect corners with wood blocking.

.5 Keep wrapping on the members until permanent protection from the weather is in place, but slit underside to prevent accumulation of moisture inside the wrapping. Do not deface members.

Part 2 Products

2.1 SUSTAINABLE DESIGN

.1 Refer to Section 01 35 60 for sustainable design requirements.

2.2 MATERIALS

.1 Laminating Stock: Douglas Fir to CSA O122 unless noted otherwise.

.2 Laminating Adhesive: CSA O112, to grade of service required in accordance with CSA O122, clear or white.

.3 Wood Sealer: Manufacturer's standard, transparent, colorless wood sealer that is compatible with indicated finish. End sealer shall be effective in retarding the transmission of moisture at cross-grain cuts.

.4 Fasteners and Metal Framing Anchors: As specified in Section 06 11 00.

.5 Steel Connections and Brackets: CSA G40.20/G40.21, hot-dip galvanized to ASTM A123 unless noted otherwise.

.6 Wrapping Materials: Weatherproof, lightproof, stain-free material.

2.3 WOOD TREATMENT

.1 Wood Preservative (Pressure Treatment): CSA O80 Series.

.2 Wood Preservative (Surface Application): CSA O80 Series treated by immersion (not by brush).

.3 Identification: Identify preservative-treated wood with certification mark authorized by the Canadian Wood Preservers Bureau (CWPB).

.4 Application: Treat items indicated on the Drawings.

2.4 FABRICATION

.1 General: Fabricate glued-laminated structural members to CSA O122 and to the following classifications unless noted otherwise on the Drawings:

.1 Stress Grade: 24f-E bending grade for members primarily in bending; 24f-EX bending grade for members with cantilevers or continuous over a support; 16c-E compression grade for members primarily in compression; 26t-E tension grade for members primarily in tension.

.2 Service Grade: Exterior unless noted otherwise on the Drawings.

.3 Appearance Grade: Quality where exposed, Commercial where not exposed.

.2 Verify dimensions and site conditions prior to fabrication.

.3 Shop fabricate for connections to the greatest extent possible, including cutting to length and drilling bolt holes. Dress exposed surfaces as needed to remove planing and surfacing marks.

.4 Mark members for identification during erection. Ensure marks will be concealed in final assembly for appearance grade members. Clearly mark top surface.

.5 Camber: Fabricate horizontal members with circular or parabolic camber equal to 1/500 of span.

.6 Splices: Do not splice or join members in locations other than those indicated without permission.

.7 End-Cut Sealing: Immediately after end cutting each member to final length and after preservative treatment (if applicable), apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces flood coated for not less than 10 minutes.

.8 Seal Coat: After fabricating, sanding, and end-coat sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each unit except for preservative-treated wood where treatment included a water repellent.

.9 End Caps: For all members on the exterior of the building, provide a shop-applied 13mm thick end cap of matching wood material glued to the end face. Shop apply three coats of sealant to all sides and end caps of members when exposed to rain or moisture.

.10 Where preservative-treated members are indicated, fabricate (cut, drill, surface, and sand) before treatment to greatest extent possible. Where fabrication must be done after treatment, apply a field-treatment preservative to comply with CSA O80.

.11 Steel: Fabricate steel hardware and connections with joints neatly fitted, welded, and ground smooth.

Part 3 Execution

3.1 EXAMINATION

.1 Examine substrates in areas to receive structural glued-laminated timber, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

.1 General: Erect structural glued-laminated timber in accordance with final reviewed shop drawings, true and plumb, and with uniform, close-fitting joints. Fit members without trimming, cutting, or other modifications, unless approved in writing by the Consultant.

.2 Provide temporary shores, guys, braces, and other supports during erection to keep structural glued-laminated timber secure, plumb, and in alignment against wind loads, seismic loads, temporary construction loads, and loads equal in intensity to design loads. Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Installer.

.3 Handle and temporarily support glued-laminated timber to prevent surface damage, compression, and other effects that might interfere with indicated finish.

.4 Install timber connectors as indicated. Install bolts with same orientation within each connection and in similar connections.

.5 See architectural Drawings and Specifications for field finish requirements for members exposed to view.

.6 Repair damaged surfaces and finishes after completing erection. Replace damaged structural glued-laminated timber if repairs are not approved by Architect.

.7 Site cutting or boring of glued-laminated members, other than shown on shop drawings, is not permitted without written consent of Consultant.

3.3 PROTECTION

.1 Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose, including protection from weather, sunlight, soiling, and damage from Work of other trades.

.2 Coordinate wrapping removal with finishing Work. Retain wrapping where it can serve as a painting shield.

.3 Slit underside of wrapping to prevent accumulation of moisture inside the wrapping. Do not deface members.

3.4 ERECTION TOLERANCES

.1 Columns:

.1 Plumbness: 0.25% of column height (1:400) maximum deviation from plumb.

.2 Position: plus or minus 10mm from theoretical at base in both directions.

.2 Beams:

.1 Elevation: plus or minus 10mm from theoretical.

.2 Position: plus or minus 10mm from theoretical.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Structural composite lumber as specified on the Drawings:

.1 Laminated Strand Lumber (LSL).

.2 Laminated Veneer Lumber (LVL).

.3 Parallel Strand Lumber (PSL).

.2 Connection hardware.

1.2 RELATED SECTIONS

.1 Section 01 35 00 – Delegated Design.

.2 Section 01 35 60 - Sustainable Certification Requirements and Submittals.

.3 Section 05 12 00 - Structural Steel.

.4 Section 06 11 00 - Wood Framing.

.5 Section 09 90 00 - Painting and Coatings.

1.3 REFERENCES

.1 ASTM A123/A123M-09 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A153/A153M-09 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.3 ASTM A307-12 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.4 ASTM A563-07a - Standard Specification for Carbon and Alloy Steel Nuts.

.5 ASTM D2559-12a - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions.

.6 ASTM D5456-12 - Standard Specification for Evaluation of Structural Composite Lumber Products.

.7 CSA G40.20-04/G40.21-04 (R2009) - General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.

.8 CSA O80 Series□08 □Wood Preservation.

.9 CSA O86-09 - Engineering Design in Wood.

.10 CSA O112 Series-M1977 (R2006) - CSA Standards for Wood Adhesives.

.11 CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel.

.12 CSA W59-03 (R2008) - Welded Steel Construction (Metal Arc Welding).

.13 Alberta Building Code 2006.

.14 For Projects overseen by a Construction Manager in lieu of a General Contractor, references to “Contractor” shall apply to the relevant Subcontractor(s).

1.4 PERFORMANCE REQUIREMENTS

.1 Design all connections not detailed on the Drawings to CSA O86 unless noted otherwise.

.2 Design connections for the forces shown on the Drawings.

1.5 SUBMITTALS

.1 Product Data: For each type of product.

.1 Include data on lumber, adhesives, fabrication, and protection.

.2 For preservative-treated wood products, include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

.3 For connectors, include installation instructions.

.2 Shop Drawings: Show fabrication and erection of structural composite lumber components.

.1 Show layout of structural composite lumber system and full dimensions of each member.

.2 Clearly indicate stress grade and shop applied finishes.

.3 Include details of cuts, holes, cambers, fastenings, and connection hardware.

.3 Connection Design Calculations: For connections indicated to comply with performance requirements, where requested. Calculations shall be signed and sealed by the qualified Professional Engineer responsible for their preparation, experienced in the design of this Work and licensed at the place where the Project is located.

.4 Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating that structural composite lumber complies with the requirements in CSA O86.

.5 Weather Protection: Provide letter outlining steps to be taken during construction to ensure adequate weather protection of wood structures.

.6 Sustainable Design: Per Section 01 35 60 - Sustainable Design Requirements.

.1 Submit Regional Materials/Recycled Content Statement for composite lumber.

.2 Submit Urea-Formaldehyde Free Statement for all composite lumber used on the inside of the building.

1.6 QUALITY ASSURANCE

.1 Perform all Work in accordance with CSA O86.

.2 Welding:

.1 Perform welding Work in accordance with CSA W59.

.2 All welders employed on the Work must have passed the qualification test as set forth in CSA W47.1 within the preceding 12 months.

.3 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years of experience.

.1 Fabricating plant shall be approved by the International Code Council (ICC) or the Standards Council of Canada (SCC).

.2 A qualified agency approved by ICC or SCC shall be employed by the manufacturer to monitor the quality assurance production process on a random, unannounced basis. The qualified independent agency shall approve or establish and maintain procedures for quality assurance.

.3 The manufacturer shall warrant all products to be free from manufacturing errors of defects in workmanship or materials.

.4 Installer Qualifications: Company specializing in performing the Work of this section with minimum three years documented experience and approved by the manufacturer.

.5 Design connections not detailed on the Drawings under direct supervision of a Professional Engineer experienced in design of this Work and licensed at the place where the Project is located. Drawings of components designed by the manufacturer shall be signed and sealed by the Professional Engineer.

.6 The Professional Engineer sealing the fabricator's shop drawings is also responsible for all field review of his or her Work. The Engineer shall provide signed and sealed letters of assurance to the Consultant confirming the Work has been completed in accordance with the final reviewed shop drawings and all structural requirements.

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Individually wrap members using plastic-coated paper covering with water-resistant seams.

.2 Store members off the ground with spacer blocks so air may circulate around all faces of members.

.3 Use padded, non-marring slings for handling structural composite lumber.

.4 Protect corners with wood blocking.

.5 Keep wrapping on the members until permanent protection from the weather is in place, but slit underside to prevent accumulation of moisture inside the wrapping. Do not deface members.

Part 2 Products

2.1 SUSTAINABLE DESIGN

.1 Refer to Section 01 35 60 for sustainable design requirements.

2.2 MATERIALS

.1 Laminated Strand Lumber (LSL): Manufactured from strands of wood fiber in a continuous process with all strands oriented to the length of the member and then fed into a press.

.1 Extreme Fiber Stress in Bending (Limit States Design): 29.5 MPa (4,290 psi) for 305mm (12 in) depth.

.2 Modulus of Elasticity: 10,600 MPa (1,550,000 psi).

.3 All members are to be free of finger joints, scarfs, or mechanical connections in full-length members.

.4 Adhesives shall be exterior type conforming to the requirements of ASTM D2559.

.5 Evaluate and monitor according to ASTM D5456.

.2 Laminated Veneer Lumber (LVL): Western Species (WS) veneers 1/8 in. or 1/10 in. thick, laminated in a continuous press with all grain parallel with the length of the member.

.1 Extreme Fiber Stress in Bending (Limit States Design): 33.1 MPa (4,800 psi) for 305mm (12 in) depth.

.2 Modulus of Elasticity: 13,700 MPa (2,000,000 psi).

.3 Moisture content shall be between 7 and 16 percent.

.4 Adhesives shall be exterior type conforming to the requirements of ASTM D2559 or CSA O112.6.

.5 Evaluate and monitor according to ASTM D5456.

.3 Parallel Strand Lumber (PSL): Douglas Fir strands 1/8 in. or 1/10 in. thick, laminated in a continuous press with all grain parallel with the length of the member.

.1 Extreme Fiber Stress in Bending, Beam Orientation (Limit States Design): 36.9 MPa (5,360 psi) for 305mm (12 in) depth.

.2 Extreme Fiber Stress in Compression Parallel to Grain, Column Orientation (Limit States Design): 27.5 MPa (3,990 psi).

.3 Modulus of Elasticity: 15,100 MPa (2,200,000 psi) for beam orientation; 12,400 MPa (1,800,000 psi) for column orientation.

.4 Moisture content shall be between 7 and 16 percent.

.5 Adhesives shall be exterior type conforming to the requirements of ASTM D2559 or CSA O112.6.

.6 Evaluate and monitor according to ASTM D5456.

.4 Wood Sealer: Manufacturer's standard, transparent, colorless wood sealer that is compatible with indicated finish.

.5 Fasteners and Metal Framing Anchors: As specified in Section 06 11 00.

.6 Steel Connections and Brackets: CSA G40.20/G40.21, hot-dip galvanized to ASTM A123 unless noted otherwise.

.7 Wrapping Materials: Weatherproof, lightproof, stain-free material.

2.3 WOOD TREATMENT

.1 Wood Preservative (Pressure Treatment): As approved by manufacturer for product and intended service level.

.2 Application: Treat items indicated on the Drawings.

2.4 FABRICATION

.1 General: Fabricate structural composite lumber in a plant approved by ICC or SCC under the supervision of a certified third party inspection agency.

.2 Source Limitations: Obtain each type of structural composite lumber product from a single source from a single manufacturer.

.3 Verify dimensions and site conditions prior to fabrication.

.4 Shop fabricate for connections to the greatest extent possible, including cutting to length and drilling bolt holes. Dress exposed surfaces as needed to remove planing and surfacing marks.

.5 Identification: Mark members for identification during erection. Stamps shall indicate grade, manufacturer's name, plant number, third-party certification, and code evaluation agencies. Ensure marks will be concealed in final assembly for members exposed to view. Clearly mark top surface.

.6 Camber: Fabricate horizontal members with circular or parabolic camber equal to 1/500 of span.

.7 Splices: Do not splice or join members in locations other than those indicated without permission.

.8 Where preservative-treated members are indicated, fabricate (cut, drill, surface, and sand) before treatment to greatest extent possible. Where fabrication must be done after treatment, apply a field-treatment preservative to comply with manufacturer's recommendations.

.9 Steel: Fabricate steel hardware and connections with joints neatly fitted, welded, and ground smooth.

Part 3 Execution

3.1 EXAMINATION

.1 Examine substrates in areas to receive structural composite lumber, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

.1 General: Erect structural composite lumber in accordance with final reviewed shop drawings, true and plumb, and with uniform, close-fitting joints. Fit members without trimming, cutting, or other modifications, unless approved in writing by the Consultant.

.2 Provide temporary shores, guys, braces, and other supports during erection to keep structural composite lumber secure, plumb, and in alignment against wind loads, seismic loads, temporary construction loads, and loads equal in intensity to design loads. Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Installer.

.3 Handle and temporarily support members to prevent surface damage, compression, and other effects that might interfere with indicated finish.

.4 Built-Up Beams: Follow manufacturer's written instructions for fastening multiple members.

.5 Install timber connectors to comply with manufacturer's written instructions. Install bolts with same orientation within each connection and in similar connections.

.6 Field Finishing of Members: As specified in Section 09 90 00.

.7 Repair damaged surfaces and finishes after completing erection. Replace damaged structural composite lumber if repairs are not approved by Architect.

.8 Site cutting or boring of structural composite lumber members, other than shown on shop drawings, is not permitted without written consent of Consultant.

3.3 PROTECTION

.1 Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose, including protection from weather, sunlight, soiling, and damage from Work of other trades.

.2 Coordinate wrapping removal with finishing Work. Retain wrapping where it can serve as a painting shield.

.3 Slit underside of wrapping to prevent accumulation of moisture inside the wrapping. Do not deface members.

3.4 ERECTION TOLERANCES

.1 Columns:

.1 Plumbness: 0.25% of column height (1:400) maximum deviation from plumb.

.2 Position: plus or minus 10mm from theoretical at base in both directions.

.2 Beams:

.1 Elevation: plus or minus 10mm from theoretical.

.2 Position: plus or minus 10mm from theoretical.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Semi-Rigid Insulation

.2 Rigid Insulation

.3 Foam-in-place Insulation

.2 Related Sections:

.1 Section 03 30 00 - Cast-In-Place Concrete

.2 Section 06 11 00 - Wood Framing

.3 Section 07 26 00 - Vapour and Air Retarders

.4 Section 07 42 23 - Wood Wall Panels

.5 Section 07 42 33 - Polycarbonate Panels

.6 Section 07 42 53 - Photovoltaic Façade Panels

.7 Section 07 44 53 - Glass-Fibre-Reinforced Cementitious Panels

.8 Section 08 11 13 - Steel Doors and Frames

.9 Section 08 11 16 - Aluminum Doors and Frames

.10 Section 08 44 12 - Composite Curtain Wall and Assemblies

.11 Section 08 91 00 - Louvres

.12 Section 09 21 16 - Gypsum Board Assemblies

.13 Section 31 23 33 - Excavation, Trenching, and Backfilling

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

.2 ASTM C612, Standard Specification for Mineral Fibre Block and Board Thermal Insulation.

.3 ASTM C726, Standard Specification for Mineral Fiber Roof Insulation Board.

.4 ASTM E96/E96M, Standard Test Methods for Water Vapour Transmission of Materials.

.2 Canadian Green Building Council (CaGBC)

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

.3 Canadian Urethane Foam Contractors' Association Inc. (CUFCA)

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.5 International Living Future Institute

.1 Living Building Challenge (LBC) 2.0/2.1: Materials Petal Handbook

.6 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102, Standard Method of Test for Surface Burning.

.2 CAN/ULC-S114, Test for Determination of Non-Combustibility in Building Materials.

.3 CAN/ULC-S702, Standard for Thermal Insulation, Mineral Fibre, for Buildings.

.4 CAN/ULC-S704, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

.5 CAN/ULC-S705.1-01-AM3, Amendment 3 to Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, -Material - Specification.

.6 CAN/ULC-S705.2-05, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Application.

1.3 ACTION SUBMITTALS

.1 Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet.

.2 Submit manufacturer's installation instructions.

.3 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Documentation must address 100% of ingredients.

.4 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as “mixture” are not acceptable.

.1 Each components of a mixture shall be identified.

.5 Provide documentation as for the following LEED Credits:

.1 MR Credit 4 – Recycled Content

.2 MR Credit 5 – Regional Materials

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installers: Use companies that are members and licensed CUFCA having trained and certified installers in accordance with CAN/ULC S705.2 and CUFCA requriements.

.2 Manufacturer: Obtain air and vapour seal materials from a single manufacturer regularly engaged in manufacturing the products specified in this section.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

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

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

.3 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.4 Collect and separate for disposal packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

1.6 SITE CONDITIONS

.1 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

.2 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

.3 Ensure temperature is maintained throughout the curing period.

Part 2 Products

2.1 MATERIALS

.1 Semi-Rigid Insulation

.1 Type: mineral wool fiber, non-combustible, Type 1 in accordance with CAN/ULC S701

.2 Thermal resistance: not less than RSI 0.76/25 mm

.3 Size: 610 mm x 2440 mm x thickness required to achieve insulation value indicated on Drawings.

.4 Water absorption: maximum 0.7% by volume in conformation with ASTM C1104.

.5 Insulation binders containing phenol formaldehyde, urea formaldehyde, or other derivatives of formaldehyde are not acceptable.

.2 Rigid Insulation

.1 XPS-1:

.1 Polystyrene, extruded Type IV in accordance with CAN/ULC S701

.2 Thermal resistance: not less than RSI 0.87/25 mm

.3 Edge: square

.4 Size: 610 mm x 2440 mm x thickness required to achieve insulation value indicated on Drawings.

.5 Compressive Strength: minimum 170 kPa at 10% deformation in accordance with ASTM D1621

.6 Water absorption: maximum 0.7% by volume in conformation with ASTM D2842.

.2 EPS-1:

.1 Expanded moulded Polystyrene HD Insulation: Type 4 to CAN/ULC S701

.2 Size: 610 mm x 2440 mm x thickness required to achieve insulation value indicated on Drawings.

.1 Board Edges: Ship-lap

.3 Thermal resistance: not less than RSI 0.88/25 mm at 5 degrees Celsius.

.4 Flexural Strength: minimum 350 kPa

.5 Compressive strength: minimum 210 kPa

.6 Fire Performance: ASTM E84

.1 Flame Spread: 25 or less

.2 Smoke Developed: 450 o less.

.7 Water absorption: max 1.9% by volume, ASTM C272.

.8 Acceptable Material: Terrafoam Platinum 3000 by Beaver Plastics

.3 EPS-2:

.1 Expanded Polystyrene Insulation: Type 2 to CAN/ULC S701

.2 Acceptable Material: Terrafoam EPS by Beaver Plastics

.3 Cementitious Board: Reinforced portland cement board, reinforcing mesh embedded near both faces in accordance with ASTM C1325 or ANSI A118.9

.4 Foam-in-Place Insulation – windows, doors, penetrations through the walls Insulation: One component rigid urethane foam with the following physical properties:

.1	Density (ASTM D1622):	30.3 kg/m³
.2	Compressive Strength (ASTM D1621):	57.5 kPa
.3	Compressive Modulus (10% deflection):	848 kPa
.4	Tensile Strength (ASTM D1623):	133.5 kPa
.5	Flatwise Shear (ASTM C273):	58.5 kPa
.6	Thermal Resistance:	1.41 RSI/25 mm thickness
.7	Water Absorption (ASTM D2842):	3.0 kg/H20/m²
.8	Water Vapour Transmission (ASTM E96):	2.327 perms

2.2 ACCESSORIES

.1 Adhesive for Foundation Wall Insulation: Conforming to CGSB 71-GP-24M, Type 2.

.2 Adhesive for Below slab insulation: to CGSB 71-GP-24M, Type 1

.3 Mechanical Fasteners:

.1 High quality, impact resistant plastic fastener system specifically designed for installation of board insulation materials; 60 mm diameter, shaft length to suit insulation thickness and hot dipped galvanized fastener to suit substrate.

.2 Acceptable Materials:

.1 UCAN Fastening Products, Insulation Fasteners

.4 Flashings: Coordinate supply of end closures and flashings for grade beam insulation system with Section 07 62 00.

Part 3 Execution

3.1 INSPECTION

.1 Ensure all surfaces which are to receive insulation are clean, free of deleterious matter and are sufficiently level to allow the proper installation of insulation.

.2 Verify that all flashings, provided under other Sections, to divert moisture to exterior properly placed.

.3 Foam-in-Place:

.1 Provide sufficient ventilation during and until insulation has cured, to ensure safe working conditions. Introduce fresh air and exhaust air continuously during the 24 hour period after application.

.2 Protect adjacent surfaces from overspray and dusting.

.3 Prior to application, slightly moisten surfaces to which foam in place insulation is being applied, to accelerate curing.

.4 Temporarily brace frames as may be required to prevent possible bowing of frames due to over expansion of the foam-in-place insulation.

3.2 INSTALLATION

.1 Install insulation to maintain continuous thermal insulation, vapour barrier and air tightness for building spaces and elements.

.2 Saw-cut all board insulation.

.3 Cut and trim insulation neatly to fit spaces. Butt edges and ends tight. Fit insulation tight against mechanical, electrical and other items protruding plane of insulation.

.4 Use insulation free of broken or chipped edges.

.5 Follow the instructions for use of materials of insulation and accessory manufacturers.

.6 Insulation joints shall be staggered 1/2 length of insulation board.

3.3 INSTALLATION, SEMI-RIGID INSULATION

.1 Use emulsified adhesive only when air and substrate temperature both exceed 5°C.

.2 Apply insulation fasteners to walls and soffits at intervals that will ensure that each piece of insulation will be held by 6 fasteners in two rows located near the centre of the board along the narrow dimension and near the third points along the long dimension. Pieces with both dimensions less than 600 mm may be secured with two clips at the centre.

.3 Apply adhesive to the substrate in a continuous film not less than 3 mm thick when wet. Bed the insulation in the adhesive before the adhesive loses its tack or skins over.

3.4 INSTALLATION, RIGID INSULATION

.1 Insulate structural slabs at entrances with insulation placed horizontally underneath the concrete, and insulate surrounding slabs on grade in the same way for a distance of 1220 mm in every direction from the perimeter of the structural slab. Omit grade beam insulation on adjacent foundations for the width of the structural slab.

.2 Place grade beam insulation on exterior foundations and grade beams in locations where indicated. Apply adhesive to the substrate by the "dab" method not less than 9 mm x 19 mm size at 150 mm centres. Bed the insulation in the adhesive before the adhesive loses its tack or skins over.

.3 Protect the insulation from damage until it is covered, and replace broken, sunburned, crushed or dented insulation immediately prior to covering, co-ordinate with back-filling operations.

.1 Prevent objects and materials from entering the joint between the insulation and grade beam.

.4 Where insulation extends above grade, secure mechanically and cover insulation with cement board.

3.5 INSTALLATION, FOAM-IN-PLACE

.1 Install foam-in-place insulation around all protrusions through the exterior building envelope to achieve and maintain continuity of air/vapour seal.

.2 Install foam-in-place insulation as directed by manufacturer’s instructions.

3.6 CLEANING

.1 Cut back excess foam-in-place insulation once cured, flush with surrounding surfaces, or recess back for application of sealant as specified in Section 07 92 00 - Sealants.

.2 Upon completion of foam-in-place insulation Work, clean adjacent surfaces of overspray and dusting to the satisfaction of the Architect.

3.7 SCHEDULE

.1 Semi-rigid Insulation:

.1 Exterior Walls

.2 Soffits.

.2 XPS-1:

.1 Below Slab with protection board, extent below slab is one board width around perimeter of building and under all in-slab heating areas.

.2 Exterior Walls

.3 Foundation Wall.

.3 EPS-1:

.1 Below concrete topping in floor type F2.

.4 EPS-2:

.1 Roof and slope package.

.5 Foam-in-Place Insulation:

.1 Exterior hollow steel door frames

.2 Door frames and windows

.3 Around protrusions through the exterior wall envelope and junctures of different cladding materials.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for the following:

.1 Vapour and Air Retarders, including self-adhered system, below slab membrane, and waterproofing membrane.

.2 Related Sections:

.1 Section 03 30 00 - Cast-In-Place Concrete

.2 Section 06 11 00 - Wood Framing

.3 Section 06 15 26 - Glued-Laminated Timber Panels

.4 Section 06 18 19 - Glued-Laminated Structural Units

.5 Section 06 18 20 - Structural Composite Lumber

.6 Section 07 21 00 - Thermal Insulation

.7 Section 07 42 23 - Wood Wall Panels

.8 Section 07 42 33 - Polycarbonate Panels

.9 Section 07 42 53 - Photovoltaic Façade Panels

.10 Section 07 44 53 - Glass-Fibre-Reinforced Cementitious Panels

.11 Section 07 52 00 - Modified Bituminous Membrane Roofing

.12 Section 07 62 00 - Sheet Metal Flashing and Trim

.13 Section 07 92 00 - Sealants

.14 Section 08 11 13 - Steel Doors and Frames

.15 Section 08 11 16 - Aluminum Doors and Frames

.16 Section 08 44 12 - Composite Curtain Wall and Accessories

.17 Section 08 91 00 - Louvres

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM):

.1 ASTM D146-04, Standard Test Methods for Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing.

.2 ASTM D412-06 ae2, Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.

.3 ASTM E96-05, Standard Test Methods for Water Vapor Transmission of Materials.

.4 ASTM E283-04, Standard Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.

.2 CAN/CGSB-19.24M-M90, Multi-Component, Chemical Curing Sealing Compound.

.3 CGSB 19-GP-14M-84, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.4 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.5 CAN/CGSB 51.34-M86, Vapour Barrier, Polyethylene Sheet, For Use in Building Construction

.1 Canadian Green Building Council (CaGBC)

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

.2 International Living Future Institute: Living Building Challenge (LBC) 2.0/2.1

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination

.1 Coordination between all installers of each component specified within this Section is essential to ensure continuity of system and that junctions between the various components are effectively sealed.

.2 Verify with manufacturers and all tradesmen involved with installation procedures of building products incorporated into air barrier elements including, but not limited to, various membranes, coatings and sealants as well as continuity with roofing membrane.

.2 Pre-Installation Meeting

.1 Convene 1 week before commencing Work of this Section.

.2 Arrange for manufacturer’s factory-trained agent to be on site at beginning of installation to provide training and supervision of personnel who will install coating. Agent shall also provide frequent inspection visits thereafter to assure quality and competence of membrane installation.

1.4 SUBMITTALS

.1 Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet.

.2 Submit manufacturer's installation instructions.

.3 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Documentation must address 100% of ingredients.

.4 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as “mixture” are not acceptable.

.1 Each components of a mixture shall be identified.

.5 Provide documentation as required for LEED Submittals:

.1 MR Credit 4.1 & MR Credit 4.2 – Recycled Content

.2 MR Credit 5.1 & MR Credit 5.2 – Regional Materials

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to job site in original unopened packages, clearly marked with manufacturer's name, brand name and description of contents.

.2 Use all means necessary to protect membrane materials before, during and after installation and, to protect the installed Work of all other trades.

.3 Protect all materials stored on site. Do not store membrane more than two pallets high off ground. Do not store in temperature above 32°C for prolonged period of time. Store in dry area, away from high heat, open flame or sparks.

1.6 SITE CONDITIONS

.1 Apply air/vapour retarder membrane to gypsum board surfaces which are dry, when temperature is 4°C or higher.

Part 2 Products

2.1 SYSTEMS

.1 Performance Criteria:

.1 Air Leakage average rates shall not exceed 0.4 cfm/ft2 under a pressure differential of 0.3” w.g.

.2 Air leakage: to CSA A440, shall not exceed 0.25 (m3/h)/m.

.3 Fire Performance:

.1 Flamespread (ASTM E84): 25 maximum.

.2 Smoke Developed (ASTM E84): 450 maximum.

.2 Vapour and Air Retarders:

.1 An air/vapour retarder system to ensure that air and air borne water vapour are prevented from exfiltration and infiltration between interior and exterior of building through exterior wall and roof construction under all conditions of air pressure differentials.

.2 Vapour and air retarders are an integral part of the building enclosure and must be installed intact and continuous on warm side of exterior insulated walls.

.3 Vapour and air retarder shall be sealed to and around all penetrations and openings (transition membranes), and to other air/vapour retarders to provide a complete envelope around building. Absolute continuity is essential.

2.2 MATERIALS, VAPOUR AND AIR RETARDERS

.1 Air and Vapour Barrier, Self-Adhered

.1 Primer: SBS synthetic rubbers, adhesive resins and solvents used to prime porous substrates to enhance adhesion of self-adhesive membranes at temperatures above -10°C.

.1 Specific gravity at 20°C (kg/l): 0.79 to 1.0 kg/l

.2 Solids by weight: 24% to 53%

.3 Flash point: -30°C to ASTM D93

.4 Basis-of-Design: Elastocol Stick, Soprema.

.2 Air/Vapour Barrier Membrane: to CAN/CGSB 37.56 or ASTM D1970; SBS modified bitumen, self-adhering sheet membrane with polyethylene facer, for application temperature above 5°C, and as follows:

.1 Thickness: 1 mm to 1.5 mm

.2 Tensile strength: minimum 6 kN/m

.3 Ultimate elongation: 25% to 40%

.4 Flexibility at cold temperature: minimum -17°C

.5 Air permeability: <0.0003 L/sec. m^2

.6 Water vapour permeability: <0.05 perm

.7 Static puncture: 400 N

.8 Tear resistance: 375 to 400 N

.9 Lap adhesion: minimum 1750 N/m

.10 Basis-of-Design: Sopraseal Stick 1100, Soprema.

.2 Below Slab on Grade

.1 Polyethylene Film: Conforming to CAN/CGSB 51.34, made from virgin resin, with U/V inhibitors, thickness of 0.152 mm (6 mil).

.3 Waterproof Membrane, Grade Beam

.1 Description: A self-adhesive waterproofing membrane composed of SBS modified bitumen and a Tri-Laminate Woven Polyethylene facer. The self-adhesive side is covered by a silicone release sheet.

.2 Characteristics (MD):

.1	Thickness:	1.5 mm
.2	Strain energy (kN/m):	3.1
.3	Ultimate elongation (%):	40
.4	Static puncture resistance (N):	400
.5	Tear resistance (N):	375
.6	Tensile strength (kN/m):	11.3

.3 Basis-of-Design: COLPHENE 3000 by Soprema.

.4 Primer: Elastocol Stick by Soprema.

.5 Insulation Adhesive and Crack filler coating: Sopraseal LM 200 T by Soprema.

Part 3 Execution

3.1 INSTALLATION

.1 Membrane Air/Vapour Retarder:

.1 Apply surface conditioner for application of sheet air/vapour retarder membrane in accordance with the membrane manufacturer's recommendations.

.2 Install sheet air/vapour retarder in accordance with manufacturer's written instructions.

.3 Corner details: Double-cover outside and inside corners, use 300 mm wide initial strip of membrane centred on axis of corner. Follow with full width of sheet membrane to cover initial strip completely.

.4 Construction and control joints: Install membrane in double thickness over properly sealed joints, use 300 mm wide initial strip of membrane centred over joint. Follow with full width of sheet membrane. Assure that joints are properly sealed; joint filler and a compatible sealant are installed.

.5 Liquid membrane shall be used at all protrusions or any difficult detail areas which do not allow for easy installation of sheet membrane. Tie-in area between liquid and sheet membranes shall be minimum 65 mm overlap.

.6 Sheet membrane: Apply sheet membrane to prepared substrate in 2400 mm lengths or as practical. Side laps must be, as marked on rolls, minimum 65 mm wide, end laps must be minimum 150 mm wide.

.7 Sealing: Trowel apply a bead of elastomeric mastic to all membrane terminations and raw edges at end of day's work.

.8 Weld the membrane using a propane gas torch.

.9 Membrane inspection and repair: Inspect installed membrane thoroughly and immediately make all necessary corrections.

.1 Repair misaligned or inadequately lapped seams, punctures or other damage with a patch of sheet membrane extending 150 mm in all directions from edge of the damaged area.

.2 Seal all edges of the patch with elastomeric mastic. Cut out and patch fishmouths.

.10 Roof/wall junction: Co-ordinate proper construction of roof/wall junction with Roofing Subcontractor so as to maintain continuity of vapour and air barrier from wall to roof.

.11 Extend membrane into glazing reglet and onto flexible flashings of aluminum windows as indicated on drawings. Seal to door frames.

.2 Below Slab on Grade:

.1 Install polyethylene on compacted grade at building perimeter before granular base and pre-cast slabs are laid.

.2 Lap all joints 200 mm and seal as recommended by sheet manufacturer.

.3 Waterproof Membrane, Grade Beam:

.1 Surface where membrane is applied shall receive an SBS synthetic rubber primer coating at the rate of: (porous surfaces: 0.3 to 0.5 L/m2, non-porous surfaces: 0.1 to 0.25 L/m2). . If not covered the same day, primed surfaces must be re-primed.

.2 All small protrusions (pipes, etc.) through the waterproofing membrane, should be pre-stripped with a membrane and sealed with waterproofing mastic.

.3 To begin application, align the first roll of membrane to a previously drawn chalk line.

.4 All edges must be pre-stripped with a 150 mm (6 in.) wide strip of membrane centered on the corner. This membrane must be installed in direct contact with the substrate not leaving any voids under the membrane strip.

.5 Install the membrane onto the primed surface by peeling back the paper backing on the underside and adhering the membrane to the surface.

.6 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.

.7 Holes and tears in the membrane must be repaired with the appropriate membrane material. The repair must exceed the affected surface area by at least 75 mm. The membrane piece applied for the repair must be sealed around its edges with mastic.

.8 Use a roller approved by manufacturer to apply pressure over the entire surface of the membrane to ensure perfect adhesion.

.9 All inside corner overlaps should be sealed with a bead of mastic after membrane installation.

.10 The uppermost edge of the membrane is to be mechanically fastened to the concrete substrate using applicable fasteners.

.11 Apply mastic on the top edge of membrane to prevent water infiltration.

.12 Any waterproofing membrane left exposed after backfilling shall be protected from ultra violet and mechanical damages.

.13 Apply adhesive with spots 75 mm (3 in) in diameter, every 300 mm (12 in). Bottom panel should be supported or mechanically fixed. On the top row of insulation, apply a continuous bead of adhesive 25 mm (1 in) wide to the top leading edge of the panels to be glued. This bead will protect the adhesive spots during initial cure by limiting the flow of moisture behind the insulation in case of rain.

3.2 PROTECTION

.1 Protect air and vapour membranes from penetrations. Repairs, if required, shall be to manufacturers written instructions.

3.3 CLEAN-UP

.1 Remove bituminous markings from finished surfaces.

.2 Clean up all debris, excess materials and equipment and remove from site.

.3 Clean any drips or spills of coatings, sealants, mastic or primers.

.4 Repair or replace defaced or disfigured finishes caused by work of this section.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Cedar siding

.2 Cedar soffit

.2 Related Sections:

.1 Section 06 11 00 - Wood Framing

.2 Section 07 21 00 - Thermal Insulation

.3 Section 07 26 00 - Vapour and Air Retarder

.4 Section 07 42 33 - Polycarbonate Panels

.5 Section 07 42 53 - Photovoltaic Façade Panels

.6 Section 07 44 53 - Glass-Fibre-Reinforced Cementitious Panels

.7 Section 07 62 00 - Sheet Metal Flashing and Trim

.8 Section 07 92 00 - Sealants

.9 Section 08 11 13 - Steel Doors and Frames

.10 Section 08 11 16 - Aluminum Doors and Frames

.11 Section 08 44 12 - Composite Curtain Wall and Accessories

.12 Section 09 90 00 - Painting and Coatings

1.2 REFERENCES

.1 Canadian Green Building Council (CaGBC)

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

.2 Environmental Choice Program (ECP).

.2 CCD-045-95, Sealants and Caulking Compounds.

.3 International Living Future Institute: Living Building Challenge (LBC) 2.0/2.1

.4 National Lumber Grades Authority (NLGA).

.3 NLGA Standard Grading Rules for Canadian Lumber 2003.

.5 Western Red Cedar Lumber Association "Specifying Western Red Cedar Siding".

.6 Western Wood Products Association Publication Standard Patterns.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination

.1 Coordination between all installers of each component specified within this Section is essential to ensure continuity of system and that junctions between the various components are effectively sealed.

.2 Verify with manufacturers and all tradesmen involved with installation procedures of building products incorporated into air barrier elements including, but not limited to, various membranes, coatings and sealants as well as continuity with roofing membrane.

.2 Pre-Installation Meeting

.1 Convene 1 week before commencing Work of this Section.

.2 Arrange for manufacturer's factory-trained agent to be on site at beginning of installation to provide training and supervision of personnel who will install coating. Agent shall also provide frequent inspection visits thereafter to assure quality and competence of membrane installation.

1.4 SUBMITTALS

.1 Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet.

.2 Submit manufacturer's installation instructions.

.2 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Documentation must address 100% of ingredients.

.4 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as "mixture" are not acceptable.

.1 Each components of a mixture shall be identified.

.5 Provide documentation as required for LEED Submittals:

.1 MR Credit 4.1 & MR Credit 4.2 – Recycled Content

.2 MR Credit 5.1 & MR Credit 5.2 – Regional Materials

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to job site in original unopened packages, clearly marked with manufacturer's name, brand name and description of contents.

Part 2 Products

2.1 MATERIALS, CEDAR

.1 Acceptable Manufacturer: Western Red Cedar Lumber Association, 1501 - 700 W. Pender St. Pender Place 1, Business Bldg; Vancouver, BC, Canada V6C 1G8; Toll Free Tel: 866-778-9096; Tel: 604-684-0266.

.2 Clear Cedar Lap Siding: Western Red Cedar graded to meet NLGA Grading Standards, paragraph 200, and WCLIB Grading Standards, paragraph 102.

.1 Pattern Grade: A Clear and Better.

.2 Profile: Tongue & Groove Siding, centre matched.

.3 Type: Knotty NLGA 204a.

.4 Texture: Smooth faced.

.5 Moisture Content: Kiln-dried, below 15% moisture content prior applying finishes.

.6 Siding Size: 19 mm x 152 mm x longest practical length.

.7 Finish: Factory finished in accordance with Section 09 90 00, colour to match Sansin Butternut #24.

.3 Sealants: as required by manufacturer.

2.2 ACCESSORIES

.1 Exposed trim, closures, cap pieces to match PT-1.

.2 Girts: Fabricated from minimum 1.21 mm base metal thickness galvanized steel to ASTM A653, Grade 230 with Z275 coating; finish material visible after assembly of wall system.

.3 Vertical Channels: Fabricated from minimum 1.21 mm base metal thickness galvanized steel to ASTM A653, Grade 230 with Z275 coating; finish material visible after assembly of wall panel.

.4 Fasteners: nails to CSA B111, No. 316 stainless steel, sized as required, splitless siding nail type with flat head, length sufficient to penetrate solid wood minimum 32 mm.

.5 Soffit suspension system: 12 ga. Air craft cable; Carrier: universal hat shaped, 1 mm roll-formed aluminum section with hook shaped tabs spaced to receive soffit panels, support holes spaced 100 mm on centre.

Part 3 Execution

3.1 INSTALLATION, CEDAR SIDING

.1 Select siding boards of longest possible lengths. Discard boards that are warped, twisted, bowed, crooked or otherwise defective.

.2 Install sheathing paper horizontally by stapling, with 50% overlap on each sheet for average 2-layers over protected surface.

.3 Install sill flashings, wood starter strips, inside corner flashings, edgings and flashings over openings.

.4 Fasten wood siding in straight, aligned lengths to sheathing in accordance with Western Red Cedar Lumber Association's directions.

.5 Install siding with joints on varying 610 mm increments, ensuring joints do not line up with one another.

.6 Seal cut surfaces. Apply touch-up coats as required.

3.2 INSTALLATION, CEDAR SOFFIT

.1 Where used secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

.2 Space hangers not more than 1220 mm on center, along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 200 mm from ends of each member. Supply supporting calculations from licensed Structural Engineer verifying hanger spacing meets all requirements, when spacing exceed those recommended.

.3 Secure bracing wires to ceiling suspension members and to supports acceptable to Architect / Engineer and or inspector. Suspend bracing from building's structural members and / or structural deck, as required for hangers.

.4 Adjust suspension system runners so they are square (within .5 degree from 90 degrees) and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

.5 Install cedar soffit panels in coordination with suspension system,

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Polycarbonate panels.

.2 Related Sections:

.1 Section 03 30 00 - Cast-In-Place Concrete

.2 Section 06 11 00 - Wood Framing

.3 Section 06 18 19 - Glue-Laminated Structural Units

.4 Section 06 18 20 - Structural Composite Lumber

.5 Section 07 21 00 - Thermal Insulation

.6 Section 07 26 00 - Vapour and Air Retarders

.7 Section 07 42 33 - Wood Wall Panels

.8 Section 07 42 53 - Photovoltaic Façade Panels

.9 Section 07 44 53 - Glass-Fibre-Reinforced Cementitious Panels

.10 Section 07 62 00 - Sheet Metal Flashing and Trim

.11 Section 07 92 00 - Sealants

.12 Section 08 11 13 - Steel Doors and Frames

.13 Section 08 44 12 - Composite Curtain Wall and Accessories

.14 Section 09 90 00 - Painting and Coatings

1.2 REFERENCES

.1 Canadian Green Building Council (CaGBC)

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

.2 International Living Future Institute: Living Building Challenge (LBC) 2.0/2.1

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination

.1 Coordination between all installers of each component specified within this Section is essential to ensure continuity of system and that junctions between the various components are effectively sealed.

.2 Verify with manufacturers and all tradesmen involved with installation procedures of building products incorporated into air barrier elements including, but not limited to, various membranes, coatings and sealants as well as continuity with roofing membrane.

.2 Pre-Installation Meeting

.1 Convene 1 week before commencing Work of this Section.

.2 Arrange for manufacturer's factory-trained agent to be on site at beginning of installation to provide training and supervision of personnel who will install coating. Agent shall also provide frequent inspection visits thereafter to assure quality and competence of membrane installation.

1.4 SUBMITTALS

.1 Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet.

.2 Submit manufacturer's installation instructions.

.3 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Documentation must address 100% of ingredients.

.4 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as “mixture” are not acceptable.

.1 Each components of a mixture shall be identified.

.5 Provide documentation as required for LEED Submittals:

.1 MR Credit 4.1 & MR Credit 4.2 – Recycled Content

.2 MR Credit 5.1 & MR Credit 5.2 – Regional Materials

1.5 DELIVERY, STORAGE AND HANDLING

.1 Storage:

.1 Deliver materials to job site in original unopened packages, clearly marked with manufacturer's name, brand name and description of contents.

.2 Stack sheets, of same length together horizontally, or if different length, graded with the longest sheet at the bottom of the stack in order to avoid unsupported overhang.

.3 Support stacks on timber bearers, 150 mm off of the ground.

.2 Handle materials as prescribed by manufacturer.

.3 Waste management:

.1 Recycle waste panel materials in accordance with Section 01 74 21 – Construction Waste Management and Disposal.

1.6 WARRANTY

.1 Provide manufacturer’s standard 10-year limited written warranty against long-term weathering conditions.

Part 2 Products

2.1 PERFORMANCE CRITERIA

.1 Minimum 20 year durability for cladding

.2 Maximum deflection of perimeter not to exceed L/180 and across panel to exceed L/60 under system own weight plus wind load (positive and negative) loads acting normal to the plane in accordance with the Building Code Climatic Data, wind load 1:30 years.

.3 Maximum deflection criteria applies to horizontal plane of system, width and length, as well as vertical deflection. Ensure that adequate stiffeners and fasteners are included to prevent deflection.

.4 Provide for movement of components without causing buckling, failure of joint seals, undue stress on fasteners when subject to seasonal temperature range from -40°C to +50°C, and preceding noted wind loads.

.5 Include expansion joints to accommodate movement in wall system and between wall system and building structure, where these movements are caused by deflection of building structure. Accommodate these movements, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.

.6 Provide for positive drainage to the exterior of all water entering or condensation occurring within the system in accordance with NRC Rain Screen Principles.

.7 Fire Performance:

.1 Flamespread (ASTM E84): 25 maximum.

.2 Smoke Developed (ASTM E84): 450 maximum.

2.2 MATERIALS, POLYCARBONATE PANELS

.1 Basis-of-Design: Thermoclick™ Lexan Panels by Sabic Innovative Plastics.

.2 Horizontal Girts: 18 ga. Galvanized steel to ASTM A653, Grade 230 with Z275 coating Z-bars.

.3 Clip (fix key): as provided by manufacturer.

.4 Frame:

.1 Upper and side profile: AL profile.

.2 Base: AL Profile, with and without eave.

.5 Provide remaining accessories as recommended by manufacturer, including:

.1 Gasket; and

.2 Aluminum brackets.

.6 Colour: Opal.

2.3 ACCESSORIES

.1 Sealants: as recommended by manufacturer for compatibility and in accordance with Section 07 92 00 – Sealants.

.2 Gaskets: rubber gasket, PVC gaskets are unacceptable to be used in this system.

.3 Provide Impermeable tape and bottom-end channels with anti-condensation venting tape by Multifoil.

.4 Exposed trim, closures, cap pieces to match PT-1 colour.

.5 Vertical Channels: Fabricated from minimum 1.21 mm base metal thickness galvanized steel to ASTM A653, Grade 230 with Z275 coating; finish material visible after assembly of wall panel.

Part 3 Execution

3.1 INSPECTION

.1 Prior to Work of this Section inspect thoroughly work of other related trades and verify that such work is complete to point where installation of this Section may properly commence.

.2 In event of discrepancy notify Architect immediately. Do not proceed with installation in areas of discrepancy until such discrepancy has been resolved.

3.2 PREPARATION

.1 Pre-installation Expansion: Care should be taken to allow for free expansion of the panels to prevent bowing and internal thermal stress.

.1 Thermal expansion allowance shall be made for both the length and width of the panels. Refer to manufacturer’s expansion chart for dimensions and thermal expansion.

.2 Tape delivered on panels is for protection only and not an impermeable sealing/installation tape. Replace tape prior to installation with tape prescribed by manufacturer.

.1 Prior to installation, remove approximately 50 mm of masking from al sheet edges. Remove remaining masking when installation is complete.

3.3 INSTALLATION

.1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Cut, saw and drill panels in accordance with manufacturer’s recommended tools.

.3 Install panels with rib channel perpendicular to the grade.

.4 Install panels plumb and true with adjacent cladding materials.

.5 Seal top end channels with impermeable tape and bottom end channels with anti-condensation venting tape.

.6 Drainage provisions: drill 5 mm diameter drainage holes at approximately 600 mm centres on the external face of the bottom aluminum profile, just below the sash profile, to allow condensation to drain to the exterior of the building.

.7 Remove protective film after installation procedure is completed.

3.4 CLEANING

.1 Larger areas: High-Pressure wash or steam clean panels with water only. Additives to the water should be avoided.

.2 Small areas: wash panels with a solution of mild soap and lukewarm water, using a soft, grit-free cloth or sponge. Thoroughly rinse with clean water to remove cleaner residue, dry surface with soft cloth to prevent water spotting.

.3 Ensure compatibility of cleaners and agents with UV-protected surface of polycarbonate panels.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Photovoltaic Façade Panels

.2 Related Sections:

.1 Section 03 30 00 - Cast-In-Place Concrete

.2 Section 06 11 00 - Wood Framing

.3 Section 06 18 19 - Glue-Laminated Structural Units

.4 Section 06 18 20 - Structural Composite Lumber

.5 Section 07 21 00 - Thermal Insulation

.6 Section 07 26 00 - Vapour and Air Retarders

.7 Section 07 42 23 - Wood Wall Panels

.8 Section 07 42 33 - Polycarbonate Panels

.9 Section 07 44 53 - Glass-Fibre-Reinforced Cementitious Panels

.10 Section 07 62 00 - Sheet Metal Flashing and Trim

.11 Section 07 92 00 - Sealants

.12 Section 08 11 13 - Steel Doors and Frames

.13 Section 08 44 12 - Composite Curtain Wall and Accessories

.14 Section 09 90 00 - Painting and Coatings

.15 Division 26 - Electrical

1.2 REFERENCES

.1 Canadian Green Building Council (CaGBC)

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

.2 International Living Future Institute: Living Building Challenge (LBC) 2.0/2.1

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination

.1 Coordination between all installers of each component specified within this Section is essential to ensure continuity of system and that junctions between the various components are effectively sealed.

.2 Verify with manufacturers and all tradesmen involved with installation procedures of building products incorporated into air barrier elements including, but not limited to, various membranes, coatings and sealants as well as continuity with roofing membrane.

.2 Pre-Installation Meeting

.1 Convene 1 week before commencing Work of this Section.

.2 Arrange for manufacturer's factory-trained agent to be on site at beginning of installation to provide training and supervision of personnel who will install coating. Agent shall also provide frequent inspection visits thereafter to assure quality and competence of membrane installation.

1.4 SUBMITTALS

.1 Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet.

.2 Submit manufacturer's installation instructions.

.3 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Documentation must address 100% of ingredients.

.4 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as "mixture" are not acceptable.

.1 Each components of a mixture shall be identified.

.5 Provide documentation as required for LEED Submittals:

.1 MR Credit 4.1 & MR Credit 4.2 – Recycled Content

.2 MR Credit 5.1 & MR Credit 5.2 – Regional Materials

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to job site in original unopened packages, clearly marked with manufacturer's name, brand name and description of contents.

Part 2 Products

2.1 PERFORMANCE CRITERIA

.1 Minimum 20 year durability for cladding

.2 Maximum deflection of perimeter not to exceed L/180 and across panel to exceed L/60 under system own weight plus wind load (positive and negative) loads acting normal to the plane in accordance with the Building Code Climatic Data, wind load 1:30 years.

.3 Maximum deflection criteria applies to horizontal plane of system, width and length, as well as vertical deflection. Ensure that adequate stiffeners and fasteners are included to prevent deflection.

.4 Provide for movement of components without causing buckling, failure of joint seals, undue stress on fasteners when subject to seasonal temperature range from -40°C to +50°C, and preceding noted wind loads.

.5 Include expansion joints to accommodate movement in wall system and between wall system and building structure, where these movements are caused by deflection of building structure. Accommodate these movements, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.

.6 Provide for positive drainage to the exterior of all water entering or condensation occurring within the system in accordance with NRC Rain Screen Principles.

.7 Fire Performance:

.1 Flamespread (ASTM E84): 25 maximum.

.2 Smoke Developed (ASTM E84): 450 maximum.

2.2 MATERIALS, PHOTOVOLTAIC FAÇADE PANELS

.1 PV Module: Conergy PH 250P Black

.2 PV Suspension System:

.1 Aluminum Channel & Closure Strips: B12AL by Cooper B-Line.

.2 Module Clamps with Integrated Bonding with WEEB-WMC:

.1 End Clamp: SHDEND13-31PA by Cooper B-Line, Black anodized.

.2 Mid Clamp: SHMID15G-31PA by Cooper B-Line, Black anodized.

2.3 ACCESSORIES

.1 Exposed trim, closures, cap pieces finished to match PT-1, refer to Section 09 90 00 – Painting and Coatings.

Part 3 Execution

3.1 INSPECTION

.1 Prior to Work of this Section inspect thoroughly work of other related trades and verify that such work is complete to point where installation of this Section may properly commence.

.8 In event of discrepancy notify Architect immediately. Do not proceed with installation in areas of discrepancy until such discrepancy has been resolved.

3.2 INSTALLATION, GENERAL

.1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 INSTALLATION, PV FAÇADE

.1 Install struts in accordance with manufacturer’s instructions. Provide additional metal framing as may be required to conform to Performance Requirements.

.2 Install struts attached to structural support or wall framing, using recommended bolts and clamps.

.3 All nuts and bolts shall be tightened to the following values

Recommended bolted metal framing:

Bolt Size	Torque (ft-lbs)
1/4-20	6
5/16-18	11
3/8-16	19
1/2-13	50

.4 Install insulation between struts forming tight to following applied strut to maintain continuous thermal barrier. Install insulation with disk type fasteners spaced at 305 mm (12”) vertical o/c spaced evenly from edges of insulation, and at 406 mm (16”) horizontal o/c.

.5 All fasteners shall penetrate wall framing. Where fastener does not penetrate framing, DO NOT remove fastener. Removal of fastener will damage integrity of air/vapour membrane. Realign fastener location and install new fastener in close proximity to original fastener.

.6 Install flashings to divert all moisture and condensation to exterior. Trim and flash around doors, louvers, and windows.

.7 Install exterior cladding to structural support by concealed mechanical fasteners.

.8 Install pre-formed corners and end enclosures, sealed to arrest direct weather penetration.

.9 Ensure panels aligned vertically and horizontally.

.10 Assemble and secure wall system so stresses on sealants are within manufacturers' recommended limits.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Glass-Fibre-Reinforced Cementitious Panels (Fibre Cement Panels)

.2 Related Sections:

.1 Section 03 30 00 - Cast-In-Place Concrete

.2 Section 06 11 00 - Wood Framing

.3 Section 06 18 19 - Glue-Laminated Structural Units

.4 Section 06 18 20 - Structural Composite Lumber

.5 Section 07 21 00 - Thermal Insulation

.6 Section 07 26 00 - Vapour and Air Retarders

.7 Section 07 42 23 - Wood Wall Panels

.8 Section 07 42 33 - Polycarbonate Panels

.9 Section 07 42 53 - Photovoltaic Façade Panels

.10 Section 07 62 00 - Sheet Metal Flashing and Trim

.11 Section 07 92 00 - Sealants

.12 Section 08 11 13 - Steel Doors and Frames

.13 Section 08 44 12 - Composite Curtain Wall and Accessories

.14 Section 09 90 00 - Painting and Coatings

1.2 REFERENCES

.1 Canadian Green Building Council (CaGBC)

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

.2 International Living Future Institute: Living Building Challenge (LBC) 2.0/2.1

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination

.1 Coordination between all installers of each component specified within this Section is essential to ensure continuity of system and that junctions between the various components are effectively sealed.

.2 Verify with manufacturers and all tradesmen involved with installation procedures of building products incorporated into air barrier elements including, but not limited to, various membranes, coatings and sealants as well as continuity with roofing membrane.

.2 Pre-Installation Meeting

.1 Convene 1 week before commencing Work of this Section.

.2 Arrange for manufacturer's factory-trained agent to be on site at beginning of installation to provide training and supervision of personnel who will install coating. Agent shall also provide frequent inspection visits thereafter to assure quality and competence of membrane installation.

1.4 SUBMITTALS

.1 Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet.

.2 Submit manufacturer's installation instructions.

.3 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Documentation must address 100% of ingredients.

.4 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as "mixture" are not acceptable.

.1 Each components of a mixture shall be identified.

.5 Provide documentation as required for LEED Submittals:

.1 MR Credit 4.1 & MR Credit 4.2 – Recycled Content

.2 MR Credit 5.1 & MR Credit 5.2 – Regional Materials

Part 2 Products

2.1 PERFORMANCE CRITERIA

.1 Minimum 20 year durability for cladding

.2 Maximum deflection of perimeter not to exceed L/180 and across panel to exceed L/60 under system own weight plus wind load (positive and negative) loads acting normal to the plane in accordance with the Building Code Climatic Data, wind load 1:30 years.

.3 Maximum deflection criteria applies to horizontal plane of system, width and length, as well as vertical deflection. Ensure that adequate stiffeners and fasteners are included to prevent deflection.

.4 Provide for movement of components without causing buckling, failure of joint seals, undue stress on fasteners when subject to seasonal temperature range from -40°C to +50°C, and preceding noted wind loads.

.5 Include expansion joints to accommodate movement in wall system and between wall system and building structure, where these movements are caused by deflection of building structure. Accommodate these movements, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.

.6 Provide for positive drainage to the exterior of all water entering or condensation occurring within the system in accordance with NRC Rain Screen Principles.

.7 Fire Performance:

.1 Flamespread (ASTM E84): 25 maximum.

.2 Smoke Developed (ASTM E84): 450 maximum.

2.2 MATERIALS, GLASS-FIBRE REINFORCED CEMENTITIOUS PANELS

.1 Acceptable Manufacturers:

.1 Unicrete

.2 James Hardie

.3 Ceraclad

.2 Basis-of-Design: Hardie Plank by James Hardie

.3 Properties:

.1 Thickness: 8 mm

.2 Weight: 2.3 lbs/sq.ft

.3 Finish: Smooth LapSiding

.4 Colour: TBD

2.3 ACCESSORIES

.1 Exposed trim, closures, cap pieces finished to match PT-1.

.2 Girts: Fabricated from minimum 1.21 mm base metal thickness galvanized steel to ASTM A653, Grade 230 with Z275 coating; finish material visible after assembly of wall system.

.3 Vertical Channels: Fabricated from minimum 1.21 mm base metal thickness galvanized steel to ASTM A653, Grade 230 with Z275 coating; finish material visible after assembly of wall panel.

Part 3 Execution

3.1 INSPECTION

.1 Prior to Work of this Section inspect thoroughly work of other related trades and verify that such work is complete to point where installation of this Section may properly commence.

.8 In event of discrepancy notify Architect immediately. Do not proceed with installation in areas of discrepancy until such discrepancy has been resolved.

3.2 INSTALLATION, GENERAL

.1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 INSTALLATION, GLASS-FIBRE REINFORCED CEMENTITIOUS PANELS

.1 Install materials in accordance with manufacturer's installation instructions.

.2 Block framing between studs where fibre cement panel’s horizontal joints occur.

.3 Install metal Z flashing and provide a 6 mm gap at horizontal panel joints.

.4 Place fasteners no closer than 9.5 mm from panel edges and 51 mm from panel corners.

.1 Allow minimum vertical clearance between the edge of siding and other material in strict accordance with the manufacturer's installation instructions.

.5 Maintain clearance between siding and adjacent finished grade.

.6 Specific framing and fastener requirements refer to Tables 2 and 3 in National Evaluation Service Report No. NER-405.

.7 Factory Finish Touch Up: Apply touch up paint to cut edges in accordance with manufacturer's printed instructions.

.1 Touch-up nicks, scrapes, and nail heads in pre-finished siding using the manufacturer's touch-up kit pen.

.2 Touch-up of nails shall be performed after application, but before plastic protection wrap is removed to prevent spotting of touch-up finish.

.3 Use touch-up paint sparingly. If large areas require touch-up, replace the damaged area with new pre-finished siding. Match touch up color to siding color through use of manufacturer's branded touch-up kits.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Torch applied modified bituminous roofing.

.2 Related Sections:

.1 Section 06 11 00 - Wood Framing

.2 Section 06 18 19 - Glued-Laminated Structural Units

.3 Section 07 21 00 - Thermal Insulation

.4 Section 07 26 00 - Vapour and Air Retarders

.5 Section 07 62 00 - Sheet Metal Flashing and Trim

.6 Section 07 92 00 - Sealants

.7 Section 08 44 12 - Composite Curtain Wall and Accessories

.8 Division 21-23 – Mechanical: Coordination of pipes and pipe fittings and other materials penetrating roof membranes; coordination of ductwork and other materials penetrating roof membranes.

.9 Division 26 – Electrical: Coordination conduit, wiring, communications cabling, cable trays and other materials penetrating roof membranes.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).

.1 ASTM C726-05, Standard Specification for Mineral Fibre Roof Insulation Board.

.2 ASTM C 1177/C1177M-06, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.3 ASTM D6162-00a, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.

.4 ASTM D6163-00e1, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.

.5 ASTM D6164-00, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.

.2 Canadian General Standards Board (CGSB).

.1 CGSB 37-GP-56M-80, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.2 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.1 Canadian Green Building Council (CaGBC)

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

.2 Canadian Roofing Contractors Association (CRCA)

.1 CRCA Roofing Specifications Manual.

.3 Department of Justice Canada (Jus).

.1 Canadian Environmental Protection Act, 1999 (CEPA).

.4 Health Canada / Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.5 International Living Future Institute: Living Building Challenge (LBC) 2.0/2.1

.6 Transport Canada (TC).

.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

.7 Underwriters Laboratories' of Canada (ULC).

.1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination

.1 Coordination between all installers of each component specified within this Section is essential to ensure continuity of system and that junctions between the various components are effectively sealed.

.2 Verify with manufacturers and all tradesmen involved with installation procedures of building products incorporated into air barrier elements including, but not limited to, various membranes, coatings and sealants as well as continuity with roofing membrane.

.2 Pre-Installation Meeting

.1 Convene 1 week before commencing Work of this Section.

.2 Arrange for manufacturer’s factory-trained agent to be on site at beginning of installation to provide training and supervision of personnel who will install coating. Agent shall also provide frequent inspection visits thereafter to assure quality and competence of membrane installation.

1.4 SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures:

.1 Provide copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide copies of WHMIS MSDS and indicate VOC content for:

.1 Primers

.2 Vapour retarder membrane

.3 Sealers

.4 Insulation

.5 Base and cap sheet

.6 Manufacturer's Certificate: certify that products meet or exceed specified requirements.

.7 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

.2 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures:

.1 Indicate flashing, control joints, details of the roofing which may be considered by the Consultant as special.

.2 Provide layout for tapered insulation.

.2 Sustainable Design Submittals:

.3 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.4 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.5 Documentation must address 100% of ingredients.

.6 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as “mixture” are not acceptable.

.1 Each components of a mixture shall be identified.

.7 Provide documentation as required for LEED Submittals:

.1 MR Credit 4.1 & MR Credit 4.2 – Recycled Content

.2 MR Credit 5.1 & MR Credit 5.2 – Regional Materials

.3 Test and Evaluation Reports: submit laboratory test reports certifying compliance of bitumens, roofing felts, and membrane with specification requirements.

.4 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in Part 3 – Field Quality Control.

.5 Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

1.5 QUALITY ASSURANCE

.1 Obtain roofing membrane materials through one source from a single manufacturer.

.2 Installer Qualifications: company or person specializing in application of modified bituminous roofing systems with 5 years documented experience approved by manufacturer.

.3 Roofing and sheet metal work shall be performed in conformance with roofing manufacturer’s written recommendations using materials in accordance with CAN/ULC S107 to obtain Class C fire resistance rating.

.4 Conform to Roofing Application Standards Manual as published by ARCA.

.5 Work shall be executed by an applicator approved by the ARCA as a member in good standing at time of application.

.6 Inspection: Roofing system to be inspected throughout the installation by an ARCA Warranty Ltd. Accepted independent Inspector in accordance with ARCA Warranty Ltd. Accepted Inspectors' Manual.

.7 Mock-Ups

.1 Construct a portion of roof in location agreed upon by Consultant to establish a standard of construction, workmanship, and appearance. Mock-up to include termination of cap sheet at parapet and flashing.

.2 Do not continue with work of this section until Consultant has reviewed mock-up.

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

1.6 FIRE PROTECTION

.1 Comply with safety measures described in manufacturer's written installation requirements, requirements of insurance companies and other requirements of the Authorities Having Jurisdiction.

.2 Fire Extinguishers, located within six (6) meters of each roofing torch, ULC labelled for ABC protection.

.3 At the end of each workday, use a heat detector gun to spot any smouldering or concealed hot spots. Job planning must be organized to ensure workers are still on location at least one hour after torch application.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Storage and Handling Requirements:

.1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.

.2 Provide and maintain dry, off-ground weatherproof storage.

.3 Store rolls of felt and membrane in upright position. Store membrane rolls with selvage edge up.

.4 Remove only in quantities required for same day use.

.5 Place plywood runways over completed Work to enable movement of material and other traffic.

.6 Store sealants at +5 degrees C minimum.

.7 Store insulation protected from weather, daylight and deleterious materials.

.8 Do not store materials on roof in concentrations that exceed design live load.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Waste Management and Disposal.

1.9 SITE REQUIREMENTS

.1 Do not perform roofing work when air temperature, including wind chill, falls below the membrane manufacturer's recommended limit.

.2 Do not apply roofing materials to a damp, frozen or unsuitable surface.

.3 Do not expose roofing materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during the same day.

1.10 WARRANTY

.1 Special Warranty – Roofing Membrane Manufacturer: Provide manufacturer's warranty stating that they will repair or replace defective roofing (including labour)and base flashing materials that do not remain watertight, that splits, tears, or separates at the seams or from the substrate within the specified warranty period and as follows:

.1 Warranty Period: 10 years Platinum Warranty, starting from Substantial Performance for the Project.

.2 Name of Warrantee: Warrantor shall issue a written and signed warranty identifying the Owner's name as the warrantee, and stating that executed work will remain in place and be free of any defects in materials and workmanship for the stated warranty period.

Part 2 Products

2.1 PERFORMANCE CRITERIA

.1 Roofing System: to CSA 123.21 for wind uplift resistance.

.1 Thermal Resistance value average for entire roof area: R44

.2 Thermal Resistance value at roof drains: R38

2.2 MATERIALS, ROOF

.2 Primer: Primer comprised of elastomeric bitumen, volatile solvents and adhesive enhancing additives as recommended by membrane roofing manufacturer to suit substrate and installation conditions.

.1 Basis-of-Design: Elastocol Stick, Soprema.

.3 Vapour Barrier: Premanufactured self-adhesive air/vapour barrier:

.1 Thickness: Minimum 0.8 mm.

.2 Low Temperature Flexibility: Pass at -35°C.

.3 Static Puncture: 400 N.

.4 Tear Resistance (MPa): XD=400

.5 Water Vapour Permeance: 0.92 ng/Pa•s•m^2 to ASTM E96.

.1 Basis-of-Design: Sopravap'R by Soprema

.2 Insulation and Slope Package: EPS-2, refer to Section 07 21 00 – Thermal Insulation.

.1 Adhesive: DuoTack by Soprema

.4 Support Panel: Description: high performance high-density support panel composed of SBS modified bitumen membrane with a non-woven polyester reinforcement, factory-laminated on a semi-rigid asphaltic board.

.1 Thickness: 4.8 mm

.2 Puncture Resistance, ASTM E154: 500 N

.3 Water Absoprtion, ASTM D994: 0.25%

.2 Basis-of-Design: Soprasmart Board 180 by Soprema

.5 Base Sheet: Description: Membrane composed of SBS modified bitumen and [non-woven polyester reinforcement. The surface is covered with granules and the underface is covered with sanded. The surface shall be marked with three (3) chalk lines to ensure proper roll alignment.

.1 In conformance with: CGSB 37.56-M (9th Draft).

.2 Basis-of-Design: Sopralene 180 GR by Soprema

.3 Cap Sheet for Field: Cap sheet membranes are composed of a non-woven polyester reinforcement and SBS modified bitumen.

.1 Cap sheet membrane Colour for Service Walkway: White.

.2 Basis-of-Design: Sopralene Flam 180 GR by Soprema

.4 Flashing: Sopraflash Flam Stick by Soprema

1.11 BITUMEN

.1 Asphalt: to CAN/CSA A123.4, Type 2.

1.12 SEALERS

.1 Plastic cement: solvent-based mastic containing SBS modified bitumen, fibres and mineral fillers, to CAN/CGSB-37.5

.1 Basis-of-Design: Sopramastic, Soprema.

.2 Sealing compound: to CAN/CGSB-37.29, rubber asphalt type.

.3 Sealants: 07 92 00 - Sealants.

1.13 CARPENTRY

.1 Refer to Section 06 10 00 - Rough Carpentry.

1.14 FASTENERS

.1 Adhesive: low-rise two-part urethane adhesive.

.1 Acceptable Material: Duotack by Soprema

.2 Roofing nails: Spiral nails with steel round-top cap 25 mm in diameter and 3 mm diameter shank, length to penetrate solid wood supports by at least 38 mm and plywood substrates by at least 19 mm.

.3 Ensure fasteners are not visible from below at exposed wood roof deck. Confirm length of fasteners with Consultant before purchasing.

1.15 ACCESSORIES

.1 Penetration covers: Prefabricated pitch pockets system that helps to easily incorporate waterproof roofing details in places where leaks present technical challenges.

.1 Components:

.1 Polyurethane prefabricated pitch pockets, in various sizes, with compounds that bond together.

.2 Multi-purpose, solventless mastic, polyurethane two-part adhesive, that cures rapidly after application.

.3 Multi-purpose, solventless, one component elastomeric polyurethane sealant isocyanate free.

.2 Substrate:

.1 SBS modified bitumen membrane, granuled or surface sanded.

.3 Basis-of-Design:

.1 Inter Clip System, Soprema.

Part 3 Execution

3.1 INSPECTION

.1 Prior to Work of this Section inspect thoroughly work of other related trades and verify that such work is complete to point where installation of this Section may properly commence.

.2 In event of discrepancy notify Architect immediately. Do not proceed with installation in areas of discrepancy until such discrepancy has been resolved.

.3 Inspect deck conditions including parapets, construction joints, roof drains, scuppers and scupper openings, plumbing vents, and ventilation outlets with Architect to determine readiness to proceed.

.4 Third Party Inspector shall be present for inspection.

.5 Prior to beginning of work ensure:

.1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.

.2 Curbs have been built.

.3 Roof drains have been installed at proper elevations relative to finished roof surface.

.4 Be sure plumbing, carpentry and all other work has been duly completed.

.6 Do not install roofing materials during rain or snowfall.

3.2 INSTALLATION, GENERAL

.1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 PRIMING DECK

.1 Apply deck primer to deck substrate roofing substrate at the rate recommended by manufacturer.

.2 Surfaces to be primed must be free of rust, dust or any residue that may hinder adherence.

.3 Cover primed surfaces with roofing membrane within time limits recommended by roofing membrane system manufacturer.

3.4 VAPOUR RETARDER INSTALLATION

.1 Adhere membrane vapour retarder using solvent based adhesive as per manufacturer's instructions.

.2 Provide membrane with continuous integral 300 mm wide extension at roof edge to overlap wall panels/stud wall membrane.

3.5 EXPOSED MEMBRANE ROOFING APPLICATION

.1 Insulation: fully adhered, adhesive application:

.1 Adhere insulation to air/vapour barrier on wood deck using compatible adhesive.

.2 Place boards in parallel rows with ends staggered, and in firm contact with one another.

.3 Cut end pieces to suit.

.4 Apply adhesive in continuous ribbons at 300 mm on centre.

.2 Tapered insulation application:

.1 Install tapered insulation as first insulation layer, in accordance with shop drawings. Stagger joints between layers 150 mm minimum.

.3 Protection Board Installation:

.1 Adhere protection board as instructed by manufacturer.

.2 All vertical joints between boards and insulation will be staggered.

.3 All the panels must be in perfect connection, without any significant differences in level, and must be adhered on all their surfaces completely.

.4 Apply only as many boards as can be covered in the same day.

.5 Around the drain, cut out a slight slope of 0 to 10 mm. in a 600 mm. radius.

.4 Base sheet application:

.1 Unroll base sheet on the substrate, taking care to align the edge of the first selvedge with drain centre (parallel to roof edge).

.2 Cut off corners at end laps to be covered by the next roll.

.3 Weld the base sheet onto prepared substrate.

.4 Each selvedge will overlap the previous one along lines provided for this purpose, and will overlap the ends by 150 mm (6 in). Space end laps by a minimum of 300 mm (12 in).

.5 Avoid the formation of wrinkles, swellings or fishmouths.

.5 Cap sheet application:

.1 Begin with double-selvedge starter roll. If starter roll is not used, side laps covered with granules must be de-granulated by embedding granules in torch-heated bitumen over a 75-mm (3 in) width.

.2 Unroll the membrane on the base sheet, taking care to align the edge of the first selvedge with the edge of the roof.

.3 Cut off corners at end laps at areas to be covered by the next roll.

.4 Each selvedge will overlap the previous one along lines provided for this purpose, and will overlap by 150 mm (6 in) at the ends. Space end laps a minimum of 300 mm (12 in).

.5 Heat-weld cap sheet membrane with a torch on the base sheet to create a bleed out of 3 to 6 mm (1/8 to 1/4 in).

.6 During installation, be careful not to overheat the membrane or its reinforcements.

.7 Avoid the formation of wrinkles, swellings or fishmouths.

.8 Avoid walking over finished surfaces; use rigid protective walkways as needed.

.6 Installation Of Walkways

.1 Install walkways in compliance with requirements previously stipulated for cap sheet installation. Apply primer to cap sheet before installing walkways.

.7 Flashings:

.1 Apply base sheet flashing only after primer coat is dry.

.2 Cut off corners at end laps to be covered by the next roll.

.3 Each selvedge will overlap along lines provided for this purpose, and by 150 mm (6 in) at the ends.

.4 This base sheet membrane must be welded directly to the substrate, proceeding from top to bottom using a propane torch.

.5 Avoid the formation of wrinkles, swellings or fishmouths.

.6 Do work in accordance with manufacturer's recommendations Section 07 62 00 - Sheet Metal Flashing and Trim.

.8 Roof penetrations:

.1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

3.6 FIELD QUALITY CONTROL

.1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Owner.

.2 Owner will pay for tests as specified in Section 01 45 00 - Quality Control.

.3 Inspection and testing of roofing application will be carried out by testing laboratory designated by Consultant.

3.7 CLEANING

.1 Remove bituminous markings from finished surfaces.

.2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Flashing and sheet metal work.

.2 Related Sections:

.1 Section 05 50 00 - Metal Fabrications

.2 Section 06 11 00 - Wood Framing

.3 Section 07 21 00 - Thermal Insulation

.4 Section 07 26 00 - Vapour and Air Retarders

.5 Section 07 42 23 - Wood Wall Panels

.6 Section 07 42 33 - Polycarbonate Panels

.7 Section 07 42 53 - Photovoltaic Façade Panels

.8 Section 07 44 53 - Glass-Fibre-Reinforced Cementitious Panels

.9 Section 07 52 00 - Modified Bituminous Membrane Roofing

.10 Section 07 92 00 - Sealants

.11 Section 08 11 13 - Steel Doors and Frames

.12 Section 08 11 16 - Aluminum Doors and Frames

.13 Section 08 44 12 - Composite Curtain Wall & Assemblies

.14 Section 08 91 00 - Louvres

.15 Section 09 90 00 - Painting and Coatings

1.2 REFERENCES

.1 The Aluminum Association Inc. (AA)

.1 Specifications for Aluminum Sheet Metal Work in Building Construction.

.2 DAF45-03, Designation System for Aluminum Finishes.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A606/A606M-09a, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.

.2 ASTM A653/A653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM A792/A792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.4 ASTM B32-08, Standard Specification for Solder Metal.

.5 ASTM D523-08, Standard Test Method for Specular Gloss.

.6 ASTM D822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.7 ASTM D4586-07, Standard Specification for Asphalt Roof Cement, Asbestos-Free.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.2 Canadian Green Building Council (CaGBC)

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

.4 Canadian Standards Association (CSA International)

.1 CSA A123.3-05 (R2010), Asphalt Saturated Organic Roofing Felt.

.2 AAMA/WDMA/CSA 101/I.S.2/A440-2008, Standard/Specification for Windows, Doors, and Unit Skylights.

.3 CSA B111-74(R2003), Wire Nails, Spikes and Staples.

.5 Green Seal Environmental Standards

.1 Standard GS-03-97, Anti-Corrosive Paints.

.2 Standard GS-11-10, Paints and Coatings.

.3 Standard GS-36-00, Commercial Adhesives.

.6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 International Living Future Institute

.1 Living Building Challenge (LBC) 2.0/2.1: Materials Petal Handbook

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation and to provide positive weather resistance, durability of the work, and protection of materials and finishes.

1.4 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittals Procedures:

.2 Product data:

.1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:

.2 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.3 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.4 Documentation must address 100% of ingredients.

.5 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as “mixture” are not acceptable.

.1 Each components of a mixture shall be identified.

.6 Provide documentation as required for LEED Submittals:

.1 MR Credit 4 – Recycled Content

.2 MR Credit 5 – Regional Materials

1.5 QUALITY CONTROL

.1 Installer: Engage an experienced installer having a minimum of three years experience who has completed projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

.2 Construct and install roof metal flashings in accordance with ARCA Manual details and in accordance with the ARCA Manual. If requirements conflict, this specification takes precedence over the manual.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Stack pre-formed and pre-finished material in manner to prevent twisting bending and rubbing.

.2 Provide protection for galvanized surfaces.

.3 Prevent contact of dissimilar metals during storage and protect from acids, flux, and other corrosive materials and elements

.4 Protect prefinished surfaces from scratches and from rust staining.

.5 Waste Management And Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.

1.7 WARRANTY

.1 The same warranty provisions apply to flashings associated with roofing as to the roofing.

.2 Provide Warranty for sheet metal flashing and trim to include in maintenance manuals as specified in Section 01 91 51 Building Management Manual.

Part 2 Products

2.1 METAL FLASHINGS

.1 Zinc coated galvanized steel sheet (pre-finished): Type A commercial quality to ASTM A653/A653M, with Z275 designation zinc coating.

.1 Class: F1S-Finished one side.

.2 Thickness: 0.45 mm base metal thickness, and where otherwise indicated

.3 Factory Finish: silicone modified polyester

.1 Acceptable materials:

.1 WeatherX by Valspar

.4 Colour: PT-1, submit sample for Architect's review.

.2 Form flashings, copings and fascias to profiles indicated.

2.2 SCUPPERS

.1 Form scuppers from 54 mil galvanized sheet metal.

.2 Sizes and profiles as indicated on Drawings.

.3 Provide necessary fastenings.

2.3 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Roofing Cement: to ASTM D4586, asphalt based, asbestos free.

.3 Underlay for metal flashing: No. 15 perforated asphalt felt to CSA A123.3.

.4 Sealants: as indicated in Section 07 92 00 - Sealants.

.1 Mastic Sealant: CAN/CGSB 37.29 polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.

.2 Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Section 07 92 00.

.5 Fasteners: of same material as sheet metal, to CSA B111, as recommended by sheet metal manufacturer; non-corrosive. Finish of exposed parts to match material being fastened.

.6 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.7 Solder: to ASTM B32, alloy composition Sn.

.1 Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered

.8 Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather resistant seaming and adhesive application of flashing sheet metal.

.9 Metal Accessories: Provide non-corrosive sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work. Accessories shall match or be compatible with material being installed; size and thickness as required.

.10 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

.1 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.2 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

.3 Make flashings as follows:

.1 Use 0.45 mm metal core thickness except where otherwise indicated.

.2 Use 0.62 mm metal core thickness wherever a flat length exceeding 305 mm wide occurs.

.3 Use 0.80 mm metal core thickness for concealed fastening strips.

.4 All straight run joints shall be S-Lock in roof flashings.

.5 Make joints to allow for thermal movement, space S-Lock joints at 1500 mm maximum centers.

.6 Strengthen free edges of metal flashings by folding to form a 13 mm hem.

.7 Make flashings to curbs, walls and parapets a minimum of 200 mm high, where possible.

.8 Where curb-mounted roof penetrations are not required, provide flashing sleeves and collars for all pipes and conduit extending through the roof. Sleeves shall be soldered to a piece of sheet metal extending at least 150 mm onto the surrounding roof.

.9 Make joints for corners and intersections with standing seams except where exposed of pre-finished metal when seams shall be flat locked.

.10 All bends machine made; form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.11 All metal flashings shall be back painted with bituminous paint prior to installation.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSPECTION

.1 Check mounting and counterflashing of mechanical items and report any defect to the Architect.

.2 Verify that solid wood blocking or sheathing provided to back-up all flashings and that all nails, screws set and wood provides a smooth flat plane.

.3 Verify that all reglets, provided under other sections or built-in by other trades, properly and securely located, true and level in line.

3.3 INSTALLATION: METAL FLASHING

.1 Apply metal roof flashing to roofing manufacturer’s recommended requirements.

.2 Do not install metal flashings, mechanical equipment and accessories prior to inspection by the Roofing Inspector. This includes curbs for roof-mounted items.

.3 Do not use exposed fastening unless indicated, or concealed fastening is not possible. Locations and methods shall be approved by Architect.

.4 Provide underlay under sheet metal.

.1 Secure in place and lap joints 100 mm.

.5 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.

.1 Flash joints using S-lock forming tight fit over hook strips.

.6 Lock end joints and caulk with sealant.

.7 All exposed and pre-finished flashings to provide a smooth flat surface free of indentations, bumps, oil-canning, or twists, all edges, bends hard, sharp and true to line.

3.4 SCUPPER DRAIN

.1 Install scuppers at locations indicated on drawings.

.2 Insert the scupper drain in the hole through the parapet and at the same time mark the point to cut in relation to the thickness of the parapet.

.3 The scupper shall be installed with a gradient of 3°.

.4 Fasten the scupper to substrate mechanically or with a construction adhesive/sealant.

.5 When installing into rainwater head, the cutting of the scupper shaft shall be cut at 45° with the top edge longer than the bottom. A scupper adapter can also be used to join the scupper to the down pipe.

.6 Lay waterproofing membrane over scupper outlet. Adhere the membrane to the scupper using adhesives appropriate for the membrane type in accordance to Section 07 92 00 - Sealants. Ensure adhesion to whole flange surface.

.7 Cut membrane around or dish to scupper shaft.

.4 Insert leaf grate.

3.5 CLEANING

.1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 This section specifies sealants for interior and exterior, vertical and horizontal applications that include, but are not limited to:

.1 Structural glazing;

.2 Roofing;

.3 Sanitary/plumbing;

.4 Gutters;

.5 Pavements;

.6 Concrete structures;

.7 Weather sealing;

.8 Tiling;

.9 Doors;

.10 Windows; and

.11 As indicated on drawings

.2 Related Sections:

.1 Section 06 11 00 - Wood Framing

.2 Section 06 15 26 - Glued-Laminated Timber Panels

.3 Section 06 18 19 - Glued-Laminated Structural Units

.4 Section 06 18 20 - Structural Composite Lumber

.5 Section 06 40 00 - Architectural Woodwork

.6 Section 07 26 00 - Vapour and Air Retarder

.7 Section 07 42 23 - Wood Wall Panels

.8 Section 07 42 33 - Polycarbonate Panels

.9 Section 07 42 53 - Photovoltaic Façade Panels

.10 Section 07 44 53 - Glass-Fibre-Reinforced Cementitious Panels

.1 Section 07 52 00 - Modified Bituminous Membrane Roofing

.11 Section 07 62 00 - Sheet Metal Flashing and Trim

.12 Section 08 11 13 - Steel Door Frames

.13 Section 08 11 16 - Aluminum Doors and Frames

.14 Section 08 44 12 - Composite Curtain Wall and Assemblies

.15 Section 08 80 50 - Glazing

.16 Section 09 21 16 - Gypsum Board Assemblies

.17 Divisions 20-23 - Mechanical

.18 Other Technical Sections as indicated.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM C919-08, Standard Practice for Use of Sealants in Acoustical Applications.

.2 ASTM C920-11, Standard Specification for Elastomeric Joint Sealants.

.3 ASTM D2240-05(2010), Standard Test Methods for Rubber Property, Durometer Hardness.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 19-GP-5M-84, Sealing Compound, One Component, Acrylic Base, Solvent Curing (incorporating Amendment No. 1).

.2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.

.3 CGSB 19-GP-14M, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.4 CAN/CGSB-19.13-M87, Sealing Compound, One-Component, Elastomeric, Chemical Curing.

.5 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.

.6 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 Canadian Green Building Council (CaGBC)

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

.4 International Living Future Institute

.1 Living Building Challenge (LBC) 2.0/2.1: Materials Petal Handbook

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.6 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

.7 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.3 SUBMITTALS

.1 Submittals shall be in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheets. Indicate the following:

.1 Caulking compound

.2 Primers

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.4 Manufacturers Sample Warranty

.3 Certificates:

.1 When required by Architect, submit test certificates from an approved Canadian materials testing laboratory indicating that sealants meet the requirements of the CGSB standards specified, and that the tests have been conducted in accordance with ASTM D2240.

.4 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions for each product used.

.5 Sustainable Design Submittals:

.2 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.3 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.4 Documentation must address 100% of ingredients.

.5 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as "mixture" are not acceptable.

.1 Each components of a mixture shall be identified.

.6 Provide documentation as required for LEED Submittals:

.1 IEQ Credit 4 – Low Emitting Materials: Adhesives and Sealants

1.4 QUALITY ASSURANCE

.1 Caulking shall be performed by a caulking Subcontractor with 3 or more years successful experience in Work of similar size and complexity.

.2 Before performing work of this section, submit the names of proposed materials. If specified using CGSB Standards, indicate Qualification Number.

.3 Mock-Up:

.1 Before performing caulking work do sample applications of each type of sealant for approval. Work Site locations for sample applications shall be designated by Architect. Approved samples shall form standard for this project and no work of inferior quality will be allowed. Start no final work until approval of samples is given by the Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with manufacturer's instructions.

.2 Deliver containers labelled and sealed, complete with written application and maintenance instructions.

.3 Store materials in a dry heated enclosure in accordance with manufacturer's instructions.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

.2 Remove from Work Site and dispose of packaging materials at appropriate recycling facilities.

.3 Place materials defined as hazardous or toxic in designated containers.

.4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

.5 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.6 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Architect.

.7 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.

.8 Fold up metal banding, flatten, and place in designated area for recycling.

1.7 PROJECT CONDITIONS

.1 Environmental Limitations:

.1 Do not proceed with installation of joint sealants under following conditions:

.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.

.2 When joint substrates are wet.

.2 Joint-Width Conditions:

.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

.2 Substrate must be clean, dry, and frost free.

1.8 WARRANTY

.1 Construction Manager hereby warrants that caulking work will not leak, crack, crumble, melt, shrink, run, lose adhesion or stain adjacent surfaces in accordance with General Conditions, but for three (3) years.

.2 Provide Warranty for sealants to include in maintenance manuals as specified in Section 01 91 51 - Building Management Manual.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Manufacturers: Subject to compliance with requirements in this section and as recommended by the manufacturer, manufacturers offering products that may be incorporated into the Work include the following:

.1 BASF, Sonneborn.

.2 Chemtron Manufacturing Ltd.

.3 Dow Corning Canada Inc.

.4 GE Silicones Limited.

.5 Sika Chemical of Canada Ltd.

.6 Tremco Ltd.

2.2 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.

.3 Unless otherwise specified, VOC content limits of sealants shall be in accordance with SCAQMD Rule 1168 and as follows:

.1 Architectural Materials:

.1 Sealants: VOC content limit 250 g/L.

.2 Sealant Primers for Non-Porous Surfaces: VOC content limit 250 g/L.

.3 Sealant Primers for Porous Surfaces: VOC content limit 775 g/L.

.2 Roofing:

.1 Non-Membrane Related Sealants: VOC content limit 300 g/L.

.2 Single Ply Roofing Sealants: VOC content limit 450 g/L.

.3 SBS Membrane Sealant Primer: VOC content limit 500 g/L.

.3 All Other Applications:

.1 Sealants: VOC content limit 420 g/L.

.2 Sealant Primers: VOC content limit 750 g/L.

2.3 SEALANT MATERIAL DESIGNATIONS

.1 Type S-1; acrylic sealant: Acrylic latex conforming to CAN/CGSB-19.17M.

.2 Type S-2; silicone sealant: Mould and mildew resistant conforming to CAN/CGSB-19.22M.

.3 Type S-3; silicone sealant: General construction, conforming to CAN/CGSB-19.13M.

.4 Type S-4; silicone sealant: Structural glazing, conforming to CAN/CGSB-19.13M.

.5 Type S-5; acoustical sealant: Non-hardening, conforming to CAN/CGSB-19.21M.

.6 Type S-6; air-seal sealant: Butyl non-hardening, conforming to CGSB 19-GP-14M.

.7 Type S-7; multi-component sealant: Chemical curing, exterior wall sealant conforming to CAN/CGSB-19.24M.

.8 Type S-8; horizontal joint sealant: Two component, self levelling, conforming to CAN/CGSB-19.24M and ASTM C920.

.9 Type S-9; polyurethane sealant: One component, non-sag, for general construction, conforming to CAN/CGSB-19.13M.

.10 Type S-10: Control joint sealant: two-component, epoxy-urethane, self-levelling, load bearing saw cut or preformed control joints.

.11 Type S-11; polysulphide sealant: One component, non-sag, for general construction, conforming to CAN/CGSB-19.13M.

2.4 ACCESSORIES

.1 Preformed Compressible and Non-Compressible back-up materials that are non-staining, compatible with joint substrate, sealants, primers, and other joint fillers, and are approved for applications indicated by sealant manufacturer based on experience and laboratory testing.

.1 Rod Type Sealant Backings:

.1 ASTM C1330, Type C (closed cell material with a surface skin), Type O (open cell material) or Type B (bi-cellular material with a surface skin).

.2 Use any of the preceding types, as approved in writing by joint sealant manufacturer for joint application indicated.

.3 Size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

.4 Non-adhering to sealant, to maintain two-sided adhesion across joint.

.2 High Density Foam.

.1 Extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, or extruded polyolefin foam, 32 kg/m^3 density, size as recommended by manufacturer.

.3 Bond Breaker Tape.

.1 Polyethylene bond breaker tape which will not bond to sealant.

.2 Primer: Non-staining type as recommended by sealant manufacturer.

.3 Joint Cleaner: Non-corrosive solvent type recommended by sealant manufacturer for applicable substrate materials.

2.5 COLOURS

.1 Colours: To match adjacent materials, as selected by Architect, from manufacturer's standard colour range.

2.6 SEALANT SELECTION

.1 Where no specified type of sealant is shown or specified, choose one of the sealants specified in this section appropriate for its location.

.2 Make sealant selections consistent with manufacturer's recommendations.

.3 Use acrylic sealant Type S-1 only on the interior and only in situations where little or no movement can occur.

.4 Use mould & mildew resistant silicone sealant Type S-2 for non-moving joints in washrooms and kitchens. Do not use on floors.

.5 Use structural glazing silicone Type S-4 for sealing glass, interior and exterior.

.6 Use silicone general construction sealant Type S-3 or Type S-6 and S-7 for all joints, interior and exterior, where no other specific sealant type specified.

.7 Use acoustical sealant Type S-5 and air seal sealant Type S-3 only where they will be fully concealed and only where no constant or consistent air pressure difference will exist across the joint.

.8 Use multi-component sealant type S-6, primed penetration element surfaces other than concrete, for mechanical and electrical service penetrations in concrete foundation walls.

.9 Use control joint sealant S-10 as filler for interior, horizontal saw cut or preformed control joints where joints are subject to load bearing conditions.

Part 3 Execution

3.1 PROTECTION

.1 Protect installed Work of other trades from staining or contamination.

3.2 INSPECTION

.1 Carefully inspect surfaces, materials to receive sealants and verify they are physically capable of retaining sealant bond.

.2 Verify that fillers and backing provided under other sections properly installed.

3.3 SURFACE PREPARATION

.1 Prepare surfaces in accordance with manufacturer's instructions.

.2 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.3 Maintain workmanship of highest quality in accordance with best trade practice.

.4 Ensure that joint forming materials are compatible with sealant.

.5 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work. Wire brush loose materials and other foreign matter which might impair adhesion of sealant.

.6 Use air stream to blow out dirt and water from crevices.

.7 Ensure joint surfaces are dry and frost free

.8 Prime porous materials (e.g. wood, masonry, concrete, ceramic or paver tile, etc).

.9 Prime other joints when recommended by manufacturer. Use a brush that will reach all parts of the joints. Mask adjoining surfaces with tape prior to priming to prevent staining.

3.4 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.5 BACKUP MATERIAL

.1 Use backer rod as specified, to limit depth of sealant and to act as bond breaker at back of joint.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

.3 Where depth of joint does not permit the use of backer rod apply paper masking tape to back of joint to act as bond breaker.

.4 Ensure that no joints are formed which are bonded on adjacent sides where there is any possibility of movement.

3.6 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.7 APPLICATION

.1 Apply sealant in strict accordance with manufacturer's recommendations.

.2 For joints where movement is possible, apply backer rod to achieve a joint depth of one half the joint width but not less than 9 mm; for joints larger than 25 mm use a depth of 13 mm

.3 Use pressure gun fitted with suitable nozzle. Use sufficient pressure to fill voids and joints solid.

.4 Form surface of sealant smooth, free from ridges, wrinkles, sags, or air pockets and imbedded impurities. Neatly tool surface to a slight concave appearance.

.5 Tool sealants to achieve air tight joints. Use wet tools as required.

.6 Ensure bead is solid, filling entire space between sides and bedding material, exerting sufficient pressure to obtain maximum bond, by allowing sealant to bulge out in advance of nozzle.

.7 Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature range.

.8 Seal perimeters of hollow metal door frames on both sides.

.9 Seal control joints in gypsum board and stucco, and junctures between interior partitions with exterior walls.

.10 Seal window and door frames around the inside perimeter, so that an airtight seal is obtained, as indicated on drawings.

.11 Seal joints in floors and walls and around service and mechanical and electrical fixture penetrations.

.12 Seal at all locations where dissimilar material meet.

.13 Curing

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

3.8 CLEAN UP

.1 Clean adjacent surfaces immediately and leave Work neat and clean.

.2 Remove excess and droppings, using recommended cleaners as work progresses.

.3 Remove masking tape after initial set of sealant.

.4 On porous surfaces allow sealant to cure overnight, and remove excess by light wire brushing.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Exterior aluminum doors and frames

.2 Glazing for exterior aluminum doors and frames.

.2 Include for the prep for the door hardware:

.1 Typical Exterior Hardware, refer to Section 08 71 00 – Door Hardware (this section shall be issued at a later package) are as follows

.1 Pulls, closer, weather-stripping, kick plates, locksets, electronic access control including barrier free access.

.3 Related Sections:

.1 Section 05 50 00 - Metal Fabrications

.2 Section 06 11 00 - Wood Framing

.3 Section 07 21 00 - Thermal Insulation

.4 Section 07 26 00 - Vapour and Air Retarders

.1 Section 07 42 23 - Wood Wall Panels

.2 Section 07 42 33 - Polycarbonate Panels

.3 Section 07 42 53 - Photovoltaic Façade Panels

.4 Section 07 44 53 - Glass-Fibre-Reinforced Cementitious Panels

.5 Section 07 62 00 - Sheet Metal Flashing and Trim

.6 Section 07 92 00 - Sealants

.7 Section 08 06 10 - Door and Frame Schedule

.8 Section 08 06 70 - Hardware Schedule

.9 Section 08 44 12 - Composite Curtain Wall and Assemblies

.10 Section 08 71 00 - Door Hardware

.11 Section 08 71 13 - Automatic Door Operator

.12 Section 09 90 00 - Paintings and Coatings

.13 Section 26 05 32 - Outlet Boxes

.14 Section 26 27 26 - Wiring Devices

.15 Division 26: Electrical connections for security systems and sensors.

1.2 REFERENCES

.1 Aluminum Association (AA).

.1 DAF 45-03, Designation System for Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA).

.1 AAMA 501-94, Methods of Test for Exterior Walls (incl. 501.1 and 501.2)

.2 AAMA 609-93, Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.

.3 AAMA 611-98, Voluntary Specification for Architectural Anodized Aluminum

.4 AAMA 1503-98, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

.5 AAMA AFPA-91, Anodic Finishes/Painted Aluminum

.6 AAMA CW-RS-1-96, The Rain Screen Principle and Pressure Equalized Wall Design

.7 AAMA RPC-00, Rain Penetration Control: Applying Current Knowledge

.3 American Society for Testing and Materials International, (ASTM).

.1 ASTM A653/A653M-04a, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.

.2 ASTM A167-99 (R2004), Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

.3 ASTM B209/209M-04, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

.4 ASTM B221/B221M-04, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

.5 ASTM B429-02, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube

.6 ASTM C920-05, Standard Specification for Elastomeric Joint Sealants.

.7 ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.4 Canadian General Standards Board (CGSB).

.1 CGSB 1.40-97, Anticorrosive Structural Steel Alkyd Primer

.2 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.

.3 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.

.5 Canadian Standards Association (CSA International).

.1 CAN/CSA-G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA W47.1-03, Certification of Companies for fusion Welding of Steel Structures

.4 CSA W47.2-M1987 (R2003), Aluminum Welding Qualification Code.

.5 CSA W59-03, Welded Steel Construction (Metal Arc Welding), Metric

.6 CSA W59.2-1989 (R2003), Welded Aluminum Construction

.6 Canadian Welding Bureau (CWB Group Industry Services):

.1 CWB 112E, 2003-1, Welding Symbols Study Guide

.2 CWB 113E, 94-1, Weld Quality and Examination Methods Study Guide

.7 The Society for Protective Coatings (SSPC)/National Association of Corrosion Engineers (NACE International):

.1 Surface Preparation Guidelines:

.1 SSPC-SP COM Surface Preparation Commentary for Steel and Concrete Substrates

.2 SSPC-PS Guide 12.00, Guide to Zinc-Rich Coating Systems

.8 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S702-97, Standard for Mineral Fibre Thermal Insulation for Buildings.

1.3 COORDINATION

.1 Coordinate installation of aluminum doors and frames into composite curtain wall and aluminum interior storefront frames.

1.4 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheets in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for caulking materials during application and curing.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate materials and profiles and provide full-size, scaled details of components for each type of door and frame. Indicate:

.1 Interior trim and exterior junctions with adjacent construction.

.2 Junctions between combination units.

.3 Elevations of units.

.4 Core thicknesses of components.

.5 Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, and accessories.

.6 Location of caulking.

.7 Each type of door system including location.

.8 Arrangement of hardware and required clearances.

.3 Submit catalogue details for each type of door and frame illustrating profiles, dimensions and methods of assembly.

.3 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

.4 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as “mixture” are not acceptable.

.1 Each components of a mixture shall be identified.

.3 Documentation must address 100% of ingredients.

.4 Provide documentation as for the following LEED Credits:

.1 MR Credit 4 – Recycled Content

.2 MR Credit 5 – Regional Materials

.3 IEQ Credit 4.1 – Low Emitting Materials: Adhesives and Sealants

1.5 CLOSEOUT SUBMITTALS

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

.2 Manufacturers' Field Reports: Submit two copies of manufacturers field reports.

1.6 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

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

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

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Protection:

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

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

.2 Waste Management And Disposal:

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction Waste Management And Disposal.

Part 2 Products

2.1 MANUFACTURER

.1 Acceptable Manufacturer:

.1 Oldcastle BuildingEnvelope

2.2 SYSTEM DESCRIPTION

.1 Design Criteria.

.1 Design frames and doors in exterior walls to:

.1 Accommodate expansion and contraction within service temperature range of -35 to 35 degrees C.

.2 Limit deflection of mullions to maximum 1/175th of clear span when tested to ASTM E330 under wind load of 1.2 kpa submit certificate of tests performed.

.2 Size glass thickness and glass unit dimensions to limits in accordance with CAN/CGSB-12.20.

.3 Provide continuous air barrier and vapour retarder through door system. Primarily in line with inside pane of glass and heel bead of glazing compound.

.4 Door dimensions as indicated in Section 08 06 10 - Door and Frame Schedule.

.5 Thermal Swing Door:

.1 Basis-of-Design: AD-375 Thermal Door by Oldcastle Envelope

.1 Medium Stile: 95 mm vertical stile, 64 mm top rail and 250 mm bottom rail.

.2 45 mm depth, moderate traffic applications.

2.3 OPERATION

.1 Hardware as indicated in Section 08 06 70 - Hardware Schedule.

.1 Allow for card-reader installation at each door location indicated in Section 08 06 10 – Door and Frame Schedule.

.2 Allow for supply and install of a heavy-duty, low energy automatic door operator including frame-mounted push-button. Allow for connection and control through building security system. See Section 08 71 13 – Automatic Door Operator.

2.4 MATERIALS

.1 Sheet aluminum: Alloy 1100, F temper, 1.5 mm (1/16") or 3 mm (1/8"), minimum thickness exposed sheet finished to match frames as specified above.

.2 Extruded aluminum: Alloy 6063-T5.

.3 Glass Gaskets: As specified under Section 08 80 50 - Glazing.

.4 Fasteners: To ASTM A167, stainless steel, type 304 selected to prevent galvanic action with the components fastened, of suitable size to sustain imposed loads.

.5 Supporting angles, plates, bars, rods, and other steel accessories: Mild steel CAN/CSA G40.21, shop painted with zinc chromate primer, thickness as required to sustain imposed loads and in no case less than 4.8 mm (3/16") thick.

.6 Sealant: Including primer, joint filler, as specified in Section 07 92 00 - Sealants.

.7 Dielectric separator: Bituminous paint CAN/CGSB-1.108.

.8 Thermal separator: Polyvinylchloride, 50 Shore A durometer hardness +5.

.9 Spacers for glazing, backpans/aluminum spandrels to be full length, purpose made, aluminum channels.

.10 Insulation: Refer to Section 07 20 00 – Thermal Protection.

2.5 FABRICATION: GENERAL

.1 Fit and assemble all Work in the shop insofar as practical.

.2 Carefully fit and match all Work for continuity of line and design, using rigidly secured joints with hairline contact, unless otherwise shown.

.3 Reinforce members and joints with steel plates, bars, rods or angles for rigidity and strength as needed to fulfill performance requirements. Use concealed stainless steel fasteners for jointing which cannot be welded.

.4 Provide cut-outs and integral reinforcing as required to receive hardware.

.5 Separate unlike metals or alloys with a heavy coating of bituminous paint, separator gaskets or slip gaskets as required to prevent galvanic action.

.6 Provide weepholes in glazing recess and an airseal at interior glassline.

.7 Glazing to be held by pressure plate system with snap-on covers.

.8 Aluminum doors fabricated of rigid extruded rectangular aluminum tube cut and welded together and with internal reinforcing at corners. Some manufacturer's may have to modify their standard system to meet the minimum bottom rail size noted for standard door construction.

2.6 FABRICATION: DOOR FRAMES

.1 Exterior Aluminum frame: thermally broken to profiles indicated and as required to performance requirements, but not less than 3 mm thick unless otherwise shown, suitable alloy and proper temper for extruding and adequate structural characteristics; and suitable for finishing as specified. 64 mm x 186 mm using mullion profile 64 mm x 133 mm with cap 64 mm x 19 mm.

2.7 FABRICATION: GLASS

.1 Aluminum Doors:

.1 Interior Doors: Single 6 mm clear tempered safety glazing.

.2 Exterior Doors:

.1 Exterior Entrances: Sealed glass unit tempered safety glazed doors and sidelights. 6 mm tinted exterior light; 6 mm clear interior light, low E coating to #3 surface.

2.8 ALUMINUM BRAKESHAPES

.1 Shop laminate sheet aluminum to treated plywood backing over rigid insulation to profiles and sizes as indicated; Conceal plywood backing with aluminum.

.2 Finish: To match window exterior exposed aluminum.

.3 Thickness:

2.9 FINISHES

.1 Refer to Section 09 90 00 – Paintings and Coatings for paint system application.

.2 Doors and Frames: as indicated on Door and Frame Schedule

.3 Paint non-galvanized steel clips, supports and reinforcing steel with steel primer or bituminous paint.

.4 Non-exposed surfaces may be left natural.

Part 3 Execution

3.1 INSPECTION

.1 Inspect Work and conditions affecting the Work of this Section. Proceed only after deficiencies, have been corrected.

.2 Construct flashings built-in or provided by others integrate with system to divert moisture to exterior.

.3 Verify that reglets, anchor blocks or inserts required to receive system are correctly located and installed.

.4 Verify that anchors and setting or installing components provided by this Section to others for installation are properly located and installed.

.5 Verify that building air and vapour retarding membranes can be sealed to entrance units to maintain building envelope system integrity.

3.2 PREPARATION

.1 Obtain all dimensions from the job site.

.2 Provide data, dimensions and components, anchors and assemblies to be installed by others in proper time for installation.

3.3 INSTALLATION

.1 Install in accordance with the manufacturer's written instructions and the contract documents, plumb, true, level and rigid.

.2 Conceal anchors and fitments. Exposed heads of fasteners not permitted. All joints in exposed work to be flush hairline butt joints.

.3 Use anchors that will permit sufficient adjustment for accurate alignment. Make allowance for deflection of building structure.

.4 Build in and provide supplementary reinforcing and bracing required by assembly loads and deflections.

.5 Secure Work adequately to structure in a manner not restricting thermal and wind movement.

.6 Correctly locate and install flashings, deflectors and weep holes and verify proper drainage of moisture to exterior.

.7 Maintain alignment with adjacent Work.

.8 Isolate aluminum surfaces from adjacent dissimilar materials and metals with coatings of bituminous paint.

.9 Verify stops, gaskets, splines, seals, etc. are perfectly aligned and ready to receive glazing and insulated panels as specified herein.

.10 Install glazing to details and instruction, using material specified.

.11 When a full mullion is used at perimeter framing, glazing, pocket may be stabilized for pressure plate with a block of rigid insulation.

.12 Glazing stops, snap covers and pressure plates shall be of a continuous length from corner to corner, and be fitted at corners.

.13 Preformed tapes or gaskets shall be of a continuous length corner to corner and shall be cut over length to prevent stretching. Joints, splices and corners shall be mitred and sealed.

.14 Clean contact surfaces of glazing with solvent and wipe dry. Verify glazing channels are clean, true to line, and free of dirt or debris and that weep and drainage vents are open.

.15 Rest glazing on setting blocks at 1/4 points.

.16 Caulk and seal full perimeter of door lights to provide and maintain the designed air/vapour/thermal barrier integrity and weather tightness.

.17 Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

.18 Hang doors using hardware scheduled. Adjust as required for proper operation.

.19 Install weatherstrip to provide positive contact.

.20 Install sealants and back-up materials in strict accordance with manufacturer's written instruction.

.21 Make cut-outs for hardware ie: card readers and push buttons.

3.4 CLEANING

.1 At completion and continuously as Work proceeds, remove surplus materials, debris and scrap.

.2 At completion of Work, remove protective surface covering film and wrappings.

.3 Clean glass, doors, storefront and frames using mild soap or other cleaning agent approved by manufacturer.

.4 Remove excess glazing or joint sealing materials from exposed surfaces. Clean and polish glass interior and exterior prior to official opening.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 This Section specifies curtain wall systems and assemblies of the following types:

.1 Composite with fixed lites.

.2 Manual and motor-operated operable composite lites.

.3 Composite doors and frames.

.2 This Section specifies curtainwall frames, exterior doors and operable sashes consisting of pultrusions of fibreglass-reinforced plastic (FRP).

.2 Related Sections:

.1 Section 05 41 00 - Wind-Load Bearing Steel Stud System

.2 Section 07 21 00 - Thermal Insulation

.3 Section 07 26 00 - Vapour and Air Retarders

.4 Section 07 42 23 - Wood Wall Panels

.5 Section 07 42 33 - Polycarbonate Panels

.6 Section 07 42 53 - Photovoltaic Façade Panels

.7 Section 07 44 53 - Glass-Fibre-Reinforced Cementitious Panels

.8 Section 07 52 00 - Modified Bituminous Membrane Roofing

.9 Section 07 62 00 - Sheet Metal Flashing and Trim

.10 Section 07 92 00 - Sealants

.11 Section 08 11 13 - Steel Doors and Frames

.12 Section 08 11 16 - Aluminum Doors and Frames

.13 Section 09 90 00 - Painting and Coating

1.2 REFERENCE

.1 American Society for Testing and Materials (ASTM):

.1 ASTM A653/A653M-04a, Standard Specification for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanannealed) by the Hot-Dip Process

.2 ASTM D3917-96(2002)e1 Standard Specification for Dimensional Tolerance of Thermosetting Glass-Reinforced Plastic Pultruded Shapes

.3 ASTM D3918-96 (2003), Standard Terminology Relating to Reinforced Plastic Pultruded Products

.4 ASTM E90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

.2 Canadian Standards Association (CSA):

.1 AAMA/WDMA/CSA 101/I.S.2/A440 - NAFSCSA A440.2-04, Energy Performance Evaluation of Windows and Other Fenestration Systems

.2 CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles

.3 Insulating Glass Manufacturer's Alliance (IGMA):

.1 TM-3000 (97), Glazing Guidelines for Sealed Insulating Glass Units

.4 American Architectural Manufacturers Association

.1 AAMA CW-10-12 Care and Handling of Architectural Aluminum from Shop to Site.

1.3 SEQUENCING

.1 Coordinate work of this section with installation of firestopping, vapour retarder placement, flashing placement.

1.4 SUBMITTALS

.1 Submittals shall be in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

.1 Submit Shop Drawings showing the following information:

.1 Plans, elevations and sections for all curtain wall assemblies.

.2 Provide elevation views. Indicate components, materials, finishes, location of glazing shims and locations of anchorage.

.3 Clearly indicate, in large scale, the following:

.1 Sections details showing all window perimeter conditions.

.2 Mullion details and frame corner connections, including reinforcement and its fastening if applicable.

.3 Sill flashing terminations, in isometric view, including coordination with wall cladding materials.

.4 Details showing frame anchorage to wall structure.

.5 Details showing air sealing within and around perimeter of framing.

.6 Required sizes and tolerances of openings.

.4 Provide a letter from window manufacturer identifying the AAMA/WDMA/CSA 101/I.S.2/A440 - NAFSCSA A440.2-04 requirements.

.5 Provide a stress analysis on all tinted heat/absorbing glass and light and heat reflecting glass. Submit prior to ordering glass.

.3 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Documentation must address 100% of ingredients.

.4 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as “mixture” are not acceptable.

.1 Each components of a mixture shall be identified.

.5 Provide documentation as required for LEED Submittals:

.2 MR Credit 4: Recycled Content

.3 MR Credit 5: Regional Materials

.4 IEQ Credit 4.1: Low-Emitting Materials: Adhesives and Sealants

.5 IEQ Credit 4.2: Low-Emitting Materials: Paints and Coatings

1.5 QUALITY ASSURANCE

.1 Standards And Tests:

.1 All tests of this Section do not need to be performed if documentation is submitted from a recognized testing agency showing relevant testing numbers.

.2 Glazing Unit and Frame:

.1 Submit, with shop drawings, test data, from a recognized testing agency, that shows the following window performance characteristics:

.1 Thermal transmission coefficient;

.2 Condensation resistance; and

.3 Sound transmission loss characteristic.

.2 Tests shall have been conducted in accordance with CAN/CSA-A440-M90 and must meet the standards Item 2.3 Window Performance Ratings of this section on a representative sample of a complete window unit (frame plus glazing unit).

.3 Submit with shop drawings data showing glazing unit shading coefficient and visible light transmission values. Values shall be derived using recognized computer analysis programs such as WINDOW 6.

.4 Pressure test each glazing unit to verify the air tightness of all joints such as those between glass panes and spacers and air vapour barrier; submit, upon request, reports showing test results for each glazing unit.

.2 Mock-Ups:

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

.2 Locate where directed by Consultant.

.3 Curtain Wall Mock-up:

.1 Test mock-up curtain wall for resistance to air infiltration, resistance to static and dynamic water penetration and structural performance under uniform loading.

.2 The mock-up curtain wall will be assumed to have passed these tests if its performance is shown to be as good as, or better than, the following:

Air Infiltration AAMA/WDMA/CSA 101/I.S.2/A440 - NAFSCSA A440.2-04:	A3 Rating, or 0.2 L/s/m2 at 300 Pa differential
Water Penetration AAMA/WDMA/CSA 101/I.S.2/A440 - NAFSCSA A440.2-04	B7 Rating
Structural Performance - Deflection AAMA/WDMA/CSA 101/I.S.2/A440 - NAFSCSA A440.2-04:	C5 Rating

.4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

.3 Certification:

.1 Provide written certification by a Professional Engineer registered in the area having jurisdiction that the curtain wall system complies with the applicable Building Code and that it is suitable for use on this building.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Basic Product Requirements.

.2 Handle work of this section in accordance with AAMA CW-10-12 Care and Handling of Architectural Aluminum from Shop to Site.

.3 Protect prefinished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

.4 Waste management and disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21.

1.7 AMBIENT CONDITIONS

.1 Do not install sealants when ambient and surface temperatures are less than 5ºC.

.2 Maintain this minimum temperature during and after installation of sealants.

1.8 WARRANTY

.1 For the Work of this Section, the warranty period described in the General Conditions is extended to 60 months and will include the following:

.1 Then the manufacturer will, within 20 working days, supply and install a replacement Unit.

Part 2 Products

2.1 ACCEPTABLE MATERIAL

.1 GlasCurtain: Phone: Donald Keatch, 204 291 8290

2.2 DESIGN CRITERIA

.1 Materials, fabrication, attachments, accessories, assembly and performance, other than thermal performance, shall meet or exceed applicable requirements of AAMA/WDMA/CSA 101/I.S.2/A440 - NAFSCSA A440.2-04

.2 Thermal performance shall be determined in conformance with AAMA/WDMA/CSA 101/I.S.2/A440 - NAFSCSA A440.2-04

.3 Design curtainwall to equalize both positive and negative pressure between outside air cavities surrounding insulating glass units.

.4 Design curtainwall to provide drainage from spaces around insulating glass units to exterior.

.5 Design windows to protect drainage openings from direct entrance of wind-driven rain by use of baffles or other protection.

.6 Design components to minimize and accommodate thermally induced movement.

.7 Curtain wall system constructed so that glazing unit can be removed and replaced from outside of building.

2.3 CURTAINWALL PERFORMANCE

.1 Values shall be derived using recognized computer analysis programs such as WINDOW 6

.2 Thermal Transmission Coefficient: per ASTM C236-87/AAMA 1503.1-1988;

.1 U-Value = 0.90 W/m^2°C for overall window (glazing unit plus frame).

.3 Sound transmission loss characteristic as measured by ASTM E90-09: 36-44.

2.4 OPERABLE FRAME AND SASH PERFORMANCE

.1 Meet or exceed requirements of AAMA/WDMA/CSA 101/I.S.2/A440 - NAFS, and the following performance requirements:

.2 Air Tightness Rating, Operable Windows: A3.

.3 Water Tightness Rating: B7.

.4 Wind Load Resistance Rating: C4.

.5 Forced Entry: F2, pass test for resistance to forced entry.

.6 Glazing: as indicated in this Section.

.7 Overall Operable Window U-Value: maximum 1.0 W/m^2 °C.

2.5 MATERIAL AND CONSTRUCTION, CURTAINWALL FRAME

.1 Construction:

.1 General:

.1 Thermally broken composite frame.

.2 Butt joints secured with screws into screw ports or spigot-blocks and sealed with sealant.

.3 Complete system to act as a rain screen so as to drain to exterior any water entering the frame cavity.

.2 Pressure Plate System:

.1 Pultruded composite pressure plate.

.2 Prefinished snap-on extruded aluminum cap.

.2 Flashings: aluminum finish to match curtain wall mullion sections where exposed, gravel stop edge to exterior parapet side, secured with concealed fastening method.

.1 Finish exposed surfaces of aluminum components:

.1 Painted to match PT-1, refer to Section 09 90 00 – Painting and Coatings

.3 Firestopping: refer to Drawing A003 for fire stopping and smoke seal performance criteria.

.4 Air/Vapour Barrier: Specified in Section 07 26 00 – Vapour and Air Retarders.

.5 Material:

.1 Composite: Pultruded FRP

.2 Air Seal Gasket: EPDM extrusions.

.3 Compression and Wedge Gaskets: EPDM extrusions.

.4 Fasteners & Keys: Aluminum, stainless steel, die cast zinc, cadmium plated steel.

.5 Back Section: 145 mm x 61.5 mm

.6 Fibreglass pressure plates

.7 Caps: 63.5 mm x 19mm aluminum caps

.8 Finish:

.1 Exterior Caps: painted to match PT-1, refer to Section 09 90 00 – Painting and Coatings.

.2 Back Sections: Raw Dark Grey

2.6 MATERIAL, DOOR AND FRAME

.1 Fibreglass Mat: Glass fibre chopped strand, minimum 2 ounces per square foot.

.2 Resins: Manufacturer's formulation for fabricating units to meet specified requirements.

.3 Frame Anchors: provide anchorage devices and fasteners were necessary for fastening fabricated FRP door frame to the adjacent construction-in-place as recommended by the FRP frame manufacturer.

.4 Fasteners: Stainless steel.

.5 Finish: All finished surfaces of FRP items and fabrications to be smooth, resin-rich, free of voids and without dry spots, cracks, and un-reinforced areas. Completely cover all glass fibres with resin to protect against exposure due to wear and weathering.

.1 Finish to match composite curtain wall.

2.7 MATERIAL, OPERABLE FRAME AND SASH

.1 Frame and sash profiles and glazing detailed on drawings are not intended to restrict product types conforming with these specifications.

.2 Provide FRP frame and sash, meeting the following requirements:

.1 Fibreglass Reinforced Plastic FRP: minimum 60% glass content, by weight, resins and inert filler for balance of composition.

.2 Acceptable Manufacturers

.1 Accurate Dorwin

.2 Cascadia

.3 Duxton

.3 Minimum external wall thickness of pultrusions: 2.0 mm nominal, exceeding requirements of CSA-A440 for vinyl (PVC) window wall types A, B, and C.

.4 Seal sash perimeter continuously at two locations minimum, with primary seal located between operator and exterior seal.

.5 Secure hardware and attachments using screws into H-ports or penetrating minimum of two walls of framing.

.3 Casement Hinge: Full range of in-swing and Tilt n' Turn fittings comprising interior butt hinges, single operating handle options and universal interlocked components with lock spacing adaptable to sash size

.4 Awning Hinges: low friction slide and pivot design, with Teflon filed slide shoe on roll formed stainless steel track and flat bottom. Provide on cam action sash lock at each jamb.

.1 Acceptable Material: Truth 14 Series Hinge

.5 Provide ADA handles for roto operators:

.1 Basis-of-Design: Truth 50 Series Maxim Dual Arm Operator

.6 Motor Operated Window Hardware:

.1 Operation: Wall Switch.

.2 Provide: AC actuator and 110-120V AC line voltage power source wall switch for Awning type windows.

.1 Provide tie-in for Building Management System.

.2 Actuator: exposed parts shall be black, concealed in Curtain Wall, 300 mm chain, and compatible with specified Curtain Wall.

.3 Parts listed above are not inclusive; provide accessories and parts required as directed by manufacturer.

.4 Acceptable Manufacturer: Functional Fenestration Ltd.

2.8 MATERIAL, GLASS AND GLAZING

.1 Insulating Glass Units: meet or exceed requirements of CAN/CGSB-12.8. Units shall be certified by the Insulated Glass Manufacturers Alliance (IGMA). Overall unit thickness shall be 51 mm using 6 mm glass thickness for each of three individual panes. Use two stage seal method of manufacture, as follows:

.1 Primary Seal: polyisobutylene sealing compound between glass and metal spacer/separator, super spacer bar or TDSE Intercept.

.2 Secondary Seal: polyurethane, silicone or polysulphide base sealant, filling gap between the lites of glass at the edge up to the spacer/separator and primary seal.

.2 Spacer/separator to provide continuous vapour barrier between interior of sealed unit and secondary seal.

.3 Curtain Wall and Window Unit Composition: Manufacturer to provide composition to meet performance requirements specified above.

.1 Design glass seals to prevent moisture accumulation for life of product.

.2 G1: 44 mm O/A thickness, vision sealed unit

.1 6 mm clear, heat strengthened glass, Solarban 60 on #2

.2 13 mm air space w/ argon gas, black technoform spacer bar

.3 6 mm clear, heat strengthened glass, Solarban 60 on #4

.4 13 mm air space w/ argon gas, black technoform spacer bar

.5 6 mm clear annealed glass, Sungate 600 on #6

.6 Ceramic frit pattern on #2 surface of glazing unit

.4 Ceramic Frit pattern: 3 mm dot pattern, 40% coverage.

.5 Composite Door glazing:

.1 Exterior Entrances: Sealed glass unit tempered safety glazed doors and sidelights. 6 mm tinted exterior light; 6 mm clear interior light, low E coating to #3 surface.

.6 Provide low-E coating as required to meet performance requirements.

.7 Glazing Gaskets for Sections: thermoplastic rubber or EPDM, flexible at minimum design temperature, and as follows:

.1 Profiled with a minimum of three (3) fins to contact glazing and to mechanically key into window frame and sash glazing stops, at interior and exterior of glass units.

.2 Removable without special tools and without dismantling of window frames.

.3 Designed to maintain pressure contact against glass units through design temperature range.

.4 Coextruded material is not acceptable.

.8 Glazing Gaskets for FRP Sections: Manufacturer's standard.

.9 Other Glazing Accessories: setting blocks to CAN/CSA-A440.

2.9 ACCESSORIES

.1 Steel Reinforcement: sheet steel to ASTM A653M, hot dip galvanized, minimum Z275 coating designation.

.2 Joint Sealants: Dow Corning 795, Black.

.3 Insulating Foam Sealant: one-part polyurethane, closed cell foam, skin-forming type, expanding maximum 25%.

.4 Foam Backer Rod: extruded closed cell backer rod, oversize 30 to 50%.

.5 Flashing: prefinished sheet aluminum, brake formed as indicated on drawings, 1.5 mm thick, concealed fastened.

2.10 FABRICATION, CURTAIN WALL FRAME

.1 Difference in length between opposite parallel sides of curtain wall panel shall be no more than:

.1 1.5 mm (0.06 inches) for panels with a diagonal measurement of 1800 mm (72 inches) or less

.2 3.0 mm (0.12 inches) for panels with a diagonal measurement over 1800 mm (72 inches).

.2 Difference in length between the two diagonal measurements of a curtain wall panel shall be no more than:

.1 3.0 mm (0.12 inches) for panels with a diagonal measurement of 1800 mm (72 inches) or less

.2 4.5 mm (0.18 inches) for panels with a diagonal measurement more than 1800 mm (72 inches).

.3 Seal fibreglass framing joints with butyl-polyisobutylene or silicone sealant. Mitre and sash joints at corners.

.4 Steel reinforce vertical and horizontal components of FRP window units as required by Consultant and structural design.

.5 Continuously and uniformly compress length of gaskets during installation, to compensate for linear shrinkage.

2.11 FABRICATION, DOORS AND FRAMES

.1 Ensure reinforcement at hardware points to commercial standard use of doors, refer to Section 08 11 14 - Metal Doors and Frames.

.1 Factory preparation for hardware is only allowed. Site installation of hardware is acceptable.

.2 Embed steel reinforcement for hinges in fibreglass matrix; provide for hinge leaf recesses in hinge stile.

.2 Fabricate Fibreglass Reinforced Plastic (FRP) doors seamless, flat panel, press-mould construction, rigid, neat in appearance, and free from defects including warp and buckle; 45 mm thickness of types and sizes indicated on door and frame schedule, and as follows:

.1 Core: Triangular shaped 4 mm phenolic resin impregnated kraft paper honeycomb cell core for maximum rigidity and compressive strength. Use of polyurethane foam or blasé wood cores are not permitted.

.2 Door Plates: Moulded in one continuous piece, resin reinforced with hand-laid glass fibre mat, nominal 3 mm thick, minimum 25 mil gel-coated surface.

.3 Door Edges: Fibreglass mat reinforced machine tooled resin rich FRP matrix.

.4 Glazing: openings shall be completely sealed using fibreglass pultrusions, integrated into the unit sub-frame during fabrication. Refer to Section 08 80 50 – Glazing for required glazing.

.5 Clearance between the bottom of door and floor shall not exceed 19 mm where there is no sill.

.6 Clearance between bottom of door and a raised non-combustible sill shall not exceed 10 mm.

.7 Clearance between bottom of door and nominal surface of combustible floor coverings shall not exceed 12 mm.

.8 Opening Fabrication:

.1 Seal fibreglass framing joints with butyl-polyisobutylene or silicone sealant. Mitre and heat weld full length of vinyl frame and sash joints at corners.

.2 Steel reinforce vertical and horizontal components of FRP window units as required by engineered structural design.

.3 Continuously and uniformly compress length of gaskets during installation, to compensate for linear shrinkage.

.3 Fabricate pultruded door frames to be one piece factory constructed with moulded stop. Jambs and header utilize mitre corner connections chemically weld with FRP material ground for a visibly smooth frame face. Post and beam or mechanical fastened corners and joints are not acceptable. Provide sizes and shapes as indicated on the Door and Frame schedule and as follows:

.1 Knock-down (“KD”) frames are not acceptable and will be rejected.

.2 Jambs, heads, mullions, sills and centre rails shall be straight and uniform throughout their lengths.

.3 Factory assembled frame product shall be square, free of defects, warps or buckles.

.4 Provide hardware reinforcement connections utilizing a chemical weld with FRP material at required locations. A minimum pull-out force strength of 1000 lbs per screw is required for all hardware locations.

.5 Frame finish is to be identical to door colour and finish. Integrally mould a 25 wet mil resin rich gel coat into the frame during manufacturing.

.6 Adhere to manufacturer's standards for frame profiles designed to suit construction.

Part 3 Execution

3.1 INSTALLATION, GENERAL

.1 Erection Tolerances: Erect all component parts within the following tolerances:

.1 Variations from plumb or angle shown:

.1 3 mm maximum variation in storey height or 3050 mm run, non-cumulative.

.2 Variations from level or slopes shown:

.1 3 mm maximum variation in any column-to-column space or 6100 mm run, non-cumulative.

.3 Variations from theoretical calculated position as located in plan or elevation in relation to established floor lines, column lines and other fixed elements of the structure, including variations from plumb and level:

.1 6 mm maximum variation in any column-to-column space, floor-to-floor height or 6100 mm run.

.4 Offsets in end-to-end or edge-to-edge alignment of consecutive members:

.1 1.5 mm maximum offset in any alignment.

.5 Attach and seal building air-vapour barrier to curtain wall frame as detailed on drawings to maintain continuity of building envelope air-vapour barrier.

.2 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

.3 Provide alignment attachments and shims to permanently fasten system to building structure. Clean weld surfaces; apply protective primer to field welds and adjacent surfaces.

.4 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.

.5 Provide thermal isolation where components penetrate or disrupt building insulation.

.6 Install sill flashings.

.7 Coordinate attachment and seal of perimeter air barrier and vapour retarder materials.

.8 Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

.9 Install operating sash in accordance with Section 08 80 00 - Glazing, to interior wet/dry method of glazing.

.10 Install louvres, associated flashings, blank-off plates and screening. Fit blank-off plates tight to ductwork.

.11 Install glass and infill panels in accordance with Section 08 80 00 - Glazing, to exterior wet/dry method of glazing.

3.2 INSTALLATION, DOORS AND FRAMES

.1 Install FRP doors, frames, and accessories in accordance with Shop Drawings, ASTM E 2112, manufacturer's data, and as specified.

.2 Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set; limit of acceptable frame distortion 2 mm out of plumb measured on face of frame, maximum twist corner to corner of 3 mm ; align horizontal lines in final assembly.

.3 Remove temporary braces and spreaders after completion of adjacent work, leaving surfaces smooth and undamaged after wall construction is completed.

.4 Install glazing materials and door silencers.

.5 Field assemble large screens to provide true and even alignment with flush butt hairline jointing, all fasteners concealed.

.6 Do not site-weld unless approved by Consultant in writing for the specific screen.

.7 Fill exterior frames with foamed-in-place insulation before installation of sealants and back-up materials, coordinate with Section 07 21 19.

.8 Fit FRP doors accurately in frames within clearances required for proper operation; shim as necessary for proper operation.

.9 Install hardware in accordance with manufacturers' templates and instructions.

.10 Adjust operable parts for correct clearances and function.

3.3 INSTALLATION, OPERABLE FRAME AND SASH

.1 Erect and secure window units in prepared openings, plumb and square, free from warp, twist or superimposed loads.

.2 Mount window as indicated.

.3 Secure work accurately to structure and in a manner not restricting thermal movement of materials.

.4 Transfer window dead load to wall construction by anchors alone or in combination with plastic shims. Wood shims are not acceptable.

.5 Place shims under sill frame at setting block locations, and as recommended by window frame manufacturer.

.6 Install heel bead between glass and entire frame perimeter on inner face of glass.

.7 Conceal all anchors and fitments. Exposed heads of fasteners are not permitted.

.8 Maintain dimensional tolerances after installation. Maintain alignment with adjacent work.

.9 Provide seal around interior perimeter of window frame using foam joint sealant or foam backer rod, size as required to lightly compress between frame and rough opening, and sealant.

.10 Provide seal at head and jamb of exterior perimeter of window frame using foam joint sealant or foam backer rod, size as required to lightly compress between frame and rough opening, and sealant. Do not seal sill at exterior.

.11 Install jamb extensions, casings, brick moulds and trim as indicated on drawings.

.12 Install sealant, in accordance with Section 07 92 00 - Sealants, and related materials as indicated on drawings.

.13 Install motorized units in Curtain Wall framing as directed by manufacturer.

3.4 INSTALLATION, GLAZING

.1 Clean sealing surfaces at perimeter of glass and sealing surfaces of rabbets and stop beads before applying splines or gaskets. Use solvents and cleaning agents recommended by manufacturer of sealing materials.

.2 Install glazing gaskets uniformly with accurately formed corners and bevels. Ensure that proper contact is made with glass and rabbet interfaces.

.3 Support both lites of glass thermal units on leveled setting blocks, 4 or 6 mm minimum, spaced as recommended by glass manufacturer. Provide at least one setting block at quarter points from each corner. For casement windows, locate setting blocks closer to corners as recommended by manufacturer.

.4 Center glass thermal units in glazing rabbet to maintain 6 mm minimum clearance between edges of glazing and plastic framing at sill or 4 mm minimum clearance between edges of glazing and plastic framing at sill if glazing bite incorporates a drainage channel with a depth of 3 mm minimum.

.5 Size glass thermal units to ensure exposed face of spacer is in line with glazing stops.

.6 Use spacers and shims in accordance with glass manufacturer's recommendations.

3.5 MANUFACTURER'S FIELD SERVICES

.1 Curtainwall product manufacturer to provide field review of the installation of their Products.

.2 Monitor and report installation procedures – report any installation under unacceptable conditions to Owner.

3.6 ADJUSTING

.1 Adjust operating sash for smooth operation.

3.7 CLEANING

.1 Remove all excess and scrap material and equipment involved in this installation

.2 Remove protective material from prefinished aluminum surfaces.

.3 Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

.4 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

3.8 PROTECTION

.1 Protect finished Work from damage.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 05 50 00 - Metal Fabrications

.2 Section 07 21 00 - Thermal Insulation

.3 Section 07 26 00 - Vapour and Air Retarders

.4 Section 07 42 23 - Wood Wall Panels

.5 Section 07 42 33 - Polycarbonate Panels

.6 Section 07 42 53 - Photovoltaic Façade Panels

.7 Section 07 44 53 - Glass-Fibre-Reinforced Cementitious Panels

.8 Section 07 62 00 - Sheet Metal Flashing and Trim

.9 Section 07 92 00 - Sealants

.10 Section 09 90 00 - Painting and Coatings

1.2 REFERENCES

.1 The Aluminum Association (AA)

.1 AA DAF-45, Designation System for Aluminum Finishes.

.2 Air Movement and Control Association International (AMCA)

.1 ANSI/AMCA 500-D-12, Laboratory Methods of Testing Dampers for Rating.

.2 ANSI/AMCA 500-L-12, Laboratory Methods of Testing Louvers for Rating.

.3 AMCA 501-09, Application Manual for Air Louvers.

.4 AMCA 511-10(R2012), Certified Ratings Program for Air Control Devices.

.3 American National Standards Institute (ANSI)

.1 ANSI H35.1/H35.1M-09, Alloy and Temper Designation Systems for Aluminum.

.4 American Society for Testing and Materials International (ASTM)

.1 ASTM A167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM A1008/A1008M-12a, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable.

.4 ASTM B32-08, Standard Specification for Solder Metal.

.5 ASTM B209-10, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.6 ASTM B221-12, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.7 ASTM B370-11e1, Standard Specification for Copper Sheet and Strip for Building Construction.

.8 ASTM D523-08, Standard Test Method for Specular Gloss.

.9 ASTM D822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposure of Paint and Related Coatings.

.5 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.213-2004, Etch Primer (Pretreatment Coating of Tie Coat) for Steel and Aluminum.

.2 CAN2-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.

1.3 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit WHMIS MSDS - Material Safety Data Sheets.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.

.2 Indicate fabrication and erection details, including anchorage, accessories, and finishes.

.4 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for manual or motorized operated louvres for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

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

.3 Deliver materials to the site in undamaged condition.

.2 Storage and Protection:

.1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Protect louvres from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.3 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS – MECHANICAL LOUVRES

.1 Construction: welded with exposed joints ground flush and smooth.

.2 Material: extruded aluminum alloy.

.3 Blade: storm proof pattern with centre watershed in blade, reinforcing bosses and maximum blade length to 1500 mm.

.4 Frame, head, sill and jamb: 102 mm deep one piece extruded aluminum, minimum 3 mm thick with approved caulking slot, integral to unit.

.1 Fabricate with mitred corners.

.5 Mullions: at 1500 mm maximum centres.

.6 Fastenings: stainless steel (Society of Automotive Engineers) SAE-194-8F with SAE-194-SFB nuts and resilient neoprene washers between aluminum and head of bolt, or between nut, SS washer and aluminum body.

.7 Screen: 19 mm mesh, 2 mm dia. wire aluminum bird screen on inside face of louvres in formed U-frame.

.8 Finish: Prime coat PT-1. Coordinate colour with Architect prior to fabrication.

.9 Air flow to be coordinated to optimum requirement stated in HVAC design. See air handling schedules and specifications to coordinate.

.10 Acceptable Product: ZE45 by E.H. Price

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install louvres where indicated.

.2 Adjust louvres so moving parts operate smoothly.

.3 Attach insect screen to inside face of louvre.

.4 Repair damage to louvres to match original finish.

.5 Install wall louvers using stops, mouldings, flanges, strap anchors, and jamb fasteners as appropriate for wall construction and in accordance with manufacturer's recommendations.

3.3 CLEANING

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

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.4 PROTECTION

.1 Paint copper or copper-bearing alloys in contact with dissimilar metal with heavy-bodied bituminous paint or separate with inert membrane.

.2 Where aluminum contacts metal other than zinc, paint dissimilar metal with primer and two coats of aluminum paint.

.3 Paint metal in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

.4 Paint wood or other absorptive materials that may become repeatedly wet and in contact with metal with two coats of aluminum paint or coat of heavy-bodied bituminous paint.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 05 41 00 – Wind Load Bearing Steel Stud System

.2 Section 05 50 00 – Metal Fabrications

.3 Section 06 11 00 – Wood Framing

.4 Section 07 21 00 – Thermal Insulation

.5 Section 07 92 00 – Sealants

.6 Section 09 90 00 – Painting and Coatings

1.2 REFERENCES

.1 Aluminum Association

.1 Designation for Aluminum Finishes-1997.

.2 American Society for Testing and Materials International, (ASTM)

.1 ASTM C1396/C1396M, Specification for Gypsum Wallboard.

.2 ASTM C79/C79M-03, Standard Specification for Treated Core and Non-treated Core Gypsum Sheathing Board.

.3 ASTM C442/C442M-04, Specification for Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board.

.4 ASTM C475/C475M-02, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.5 ASTM C514-04, Specification for Nails for the Application of Gypsum Board.

.6 ASTM C557-03e1, Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.

.7 ASTM C630/C630M-03, Specification for Water-Resistant Gypsum Backing Board.

.8 ASTM C840-08, Specification for Application and Finishing of Gypsum Board.

.9 ASTM C931/C931M-02, Specification for Exterior Gypsum Soffit Board.

.10 ASTM C954-07, Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

.11 ASTM C1002-07, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.12 ASTM C1047-09, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.13 ASTM C1280-07, Specification for Application of Gypsum Sheathing Board.

.14 ASTM C1177/C1177-08, Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.15 ASTM C1178/C1178M-08, Specification for Glass Mat Water-Resistant Gypsum Backing Board.

.16 ASTM E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

.17 ASTM E413, Classification for Rating Sound Insulation.

.3 Association of the Wall and Ceilings Industries International (AWEI)

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.2 CAN/CGSB-71.25-M88, Adhesives, for Bonding Drywall to Wood Framing and Metal Studs.

.5 Canada Green Building Council (CaGBC)

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

.6 International Living Future Institute

.1 Living Building Challenge (LBC) 2.0/2.1: Materials Petal Handbook

.7 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 SUBMITTALS

.1 Submittals shall be in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet.

.2 Submit manufacturer's installation instructions.

.1 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Documentation must address 100% of ingredients.

.4 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients listed as “mixture” are not acceptable.

.5 Provide documentation as required for LEED Submittals:

.1 MR Credit 4.1 & MR Credit 4.2 – Recycled Content

.2 MR Credit 5.1 & MR Credit 5.2 – Regional Materials

.3 IEQ Credit 4.1 – Low Emitting Materials: Adhesives and Sealants

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in original packages, containers or bundles bearing manufacturers brand name and identification.

.2 Store materials inside, level, under cover. Keep dry. Protect from weather, other elements and damage from construction operations and other causes.

.3 Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal accessories and trim from being bent or damaged.

1.5 SITE ENVIRONMENTAL REQUIREMENTS

.1 Maintain temperature minimum 10 degrees C, maximum 21 degrees C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 Ventilation: Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction Waste Management and Disposal.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Manufacturers:

.1 CertainTeed, telephone: 800-661-3120.

.2 Georgia-Pacific Canada, Inc., telephone: 800-387-6823

2.2 PERFORMANCE REQUIREMENTS

.1 Sound Transmission Characteristics: Provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by a qualified independent testing agency for STC ratings of specific assemblies indicated on Drawings.

2.3 GYPSUM BOARD MATERIALS

.1 Standard Board: to ASTM C1396/C1396M regular and fire resistant, thickness as indicated, 1200 mm wide x maximum practical length, ends square cut, tapered edges.

.1 Acceptable Materials:

.1 Toughrock Gypsum Wallboard (Fireguard), Georgia-Pacific Canada, Inc.

.2 ProRoc Wallboard, CertainTeed

.2 Gypsum Sheathing Board: to ASTM C79/C79M, regular and fire resistant, thickness as indicated, 1200 mm wide x maximum practical length, square edges.

.1 Acceptable Materials:

.1 Fiberock Sheathing Aqua-Tough, Georgia-Pacific Canada, Inc.

.2 GlasRoc Exterior Sheathing, CertainTeed

.3 Sag Resistant Gypsum Board: to ASTM C1396, regular and fire resistant to thickness as indicated.

.1 Acceptable Materials:

.1 CD Ceiling Board, Georgia-Pacific Canada, Inc.

.2 ProRoc Interior Ceiling Board, CertainTeed

.4 Mould Resistant Gypsum Board: to ASTM C1396, regular and fire resistant, thickness as indicated, 1200 mm wide x maximum practical length.

.1 Acceptable Materials:

.1 DensArmor Interior Guard, Georgia-Pacific Canada, Inc.

.5 Cementitious Backer Board: to ASTM C1325, thickness as indicated, 1200 mm wide x maximum practical length, substrate for ceramic tile.

.1 Acceptable Materials:

.1 Wonderboard, Georgia-Pacific Canada, Inc.

.2 SuperPanel by Bedrock Industries, CertainTeed

2.4 ACOUSTIC INSULATION MATERIALS

.1 Fibrous Acoustical Insulation: Un-faced preformed GreenGuard™ or formaldehyde free binder fibrous insulation meeting the requirements of ULC S702; having maximum flame spread and smoke developed of 25/50 in accordance with CAN/ULC S102 and being non-combustible in accordance with CAN/ULC S114 and as follows:

.1 Type: 1.

.2 Width: to friction fit in stud spaces.

.3 Thickness: to fill a minimum of 90% of the cavity thickness.

.4 Nominal density: 40 kg/m^3.

.5 Acceptable materials:

.1 Knauf Quiet Therm by Knauf Insulation

2.5 ACCESSORIES

.1 Metal furring runners, hangers, tie wires, inserts, anchors.

.2 Gypsum furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.

.3 Resilient clips: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.

.4 Nails: to ASTM C514.

.5 Steel drill screws: to ASTM C1002.

.6 Stud adhesive: to CAN/CGSB-71.25.

.7 Laminating compound: as recommended by manufacturer, asbestos-free.

.8 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, ABS, 0.5 mm base thickness, perforated flanges, one piece length per location.

.1 Basis-of-Design Trims profile: D-500 Angle Trim and D-700 Angle Framing Trim by Bailey Metal Products Ltd.

.9 Shadow mould: 35 mm high, snap-on trim, of 0.6 mm base steel thickness galvanized sheet pre-finished in satin enamel, white.

.10 Sealants: in accordance with Section 07 92 00 – Sealants.

.11 Acoustic sealant: non-hardening, non-skinning, permanently flexible and having VOC content less than the VOC limits of State of California's South Coast Air Quality Management District Rule #1168 and in accordance with Section 07 92 00 – Sealants.

.12 Insulating strip: rubberized, moisture resistant, 3 mm thick EPDM or silicone strip, 12 mm wide, with self sticking permanent adhesive on one face, lengths as required.

.13 Joint Treatment Materials: Provide joint compound and accessory materials in accordance with ASTM C475 and as follows:

.1 Joint Tape:

.1 Interior Gypsum Board: Paper.

.2 Joint Compound for Interior Gypsum Board: Vinyl based, non-asbestos, low dusting type compatible with other compounds applied on previous or for successive coats, and as follows:

.1 Pre-filling: Setting type taping compound.

.2 Embedding and First Coat: Drying type compound.

.3 Fill Coat: Drying type compound.

.4 Finish Coat: Drying type, sandable topping compound.

.5 Skim Coat: Drying type, sandable topping compound.

.6 Acceptable Materials:

.1 CertainTeed Dust Away

.14 Suspension system:

.1 Basis-of-Design: Drywall Grid System by Armstrong

.2 Accessories: as recommended by manufacturer for complete installation.

2.6 FINISHES

.1 Paint: in accordance with Section 09 90 00 – Painting and Coating.

Part 3 Execution

3.1 ERECTION

.1 Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.

.2 Do application of gypsum sheathing in accordance with ASTM C1280.

.3 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C840 except where specified otherwise.

.4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.5 Install work level to tolerance of 1:1200.

.6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, and grilles.

.7 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

.8 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

.9 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

.10 Install wall furring for gypsum board wall finishes in accordance with ASTM C840, except where specified otherwise.

.11 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.12 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

.13 Erect drywall resilient furring transversely across studs and joists, spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25 mm drywall screw.

.14 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

3.2 APPLICATION

.1 Do not apply gypsum board until bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.

.2 Apply single or double layer gypsum board to metal furring or framing using screw fasteners for first layer, screw fasteners for second layer. Maximum spacing of screws 300 mm on centre.

.1 Single-Layer Application:

.1 Apply gypsum board on ceilings prior to application of walls in accordance with ASTM C840.

.2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.

.2 Double-Layer Application:

.1 Install gypsum board for base layer and exposed gypsum board for face layer.

.2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.

.3 Apply base layers at right angles to supports unless otherwise indicated.

.4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.

.3 Apply water-resistant gypsum board where wall tiles to be applied and adjacent to janitors closets. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.

.4 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, and ducts, in partitions where perimeter sealed with acoustic sealant.

.5 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.

.6 Install gypsum board on walls vertically to avoid end-butt joints. At high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.7 Install gypsum board with face side out.

.8 Do not install damaged or damp boards.

.9 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.3 INSTALLATION

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Install shadow mould at gypsum board/ceiling juncture and as indicated. Minimize joints; use corner pieces and splicers.

.6 Construct control joints of two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.

.7 Provide continuous polyethylene dust barrier behind and across control joints.

.8 Locate control joints where indicated and at changes in substrate construction at approximate 10 m spacing on long corridor runs at approximate 15 m spacing on ceilings.

.9 Install control joints straight and true.

.10 Construct expansion joints, at building expansion and construction joints. Provide continuous dust barrier.

.11 Install expansion joint straight and true.

.12 Splice corners and intersections together and secure to each member with 3 screws.

.13 Install access doors to electrical and mechanical fixtures specified in respective sections.

.1 Rigidly secure frames to furring or framing systems.

.14 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.15 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Association of the Wall and Ceiling Industries (AWCI) International Recommended Specification on Levels of Gypsum Board Finish:

.1 Levels of finish:

.1 Level 0: No tapping, finishing or accessories required.

.2 Level 1: Embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable.

.3 Level 2: Embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable.

.4 Level 3: Embed tape for joints and interior angles in joint compound and apply two separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.

.5 Level 4: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.

.6 Level 5: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.

.16 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.17 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.18 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.19 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.20 Mix joint compound slightly thinner than for joint taping.

.21 Apply thin coat to entire surface using trowel or drywall broadknife to fill surface texture differences, variations or tool marks.

.22 Allow skim coat to dry completely.

.23 Remove ridges by light sanding or wiping with damp cloth.

.24 Provide protection that ensures gypsum drywall work will remain without damage or deterioration at time of substantial completion.

3.4 SCHEDULE

Schedule Type	Finish Level	Location
Standard	4	Interior partitions, unless otherwise indicated
Sag-Non Resistant	4	Where indicated to apply gypsum board to ceilings
Mould Resistant	4	Water closet walls and kitchens where no tiles are applied.
Cementious Backerboard	2	Where tiles are applied in water closets and kitchens.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Living wall system as specified herein including, but not limited to the following:

.1 Support system mounted to structural wall.

.2 Installation of growing medium

.3 Installation of aspects of water and fertigation system

.4 Installation of plant material

.2 All required accessories and attachment hardware.

.2 Related Sections:

.1 Section 01 35 00 – Delegated Design

.2 Section 03 30 00 – Cast-in-Place Concrete

.3 Section 05 50 00 – Metal Fabrications.

.4 Division 20-25 – Mechanical

.5 Division 26 – Electrical: Lighting Requirements

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the work with the placement of fertigation system, plumbing and electrical.

.2 Verification Of Structural Capacity:

.1 Obtain prior, written confirmation from professional engineer certifying that the structure is capable of bearing the additional load of the living wall system (i.e. 3 to 4 pounds per square foot, max 5lbs/sqft).

.3 Pre-Installation Meeting:

.1 Prior to commencement of Work on site, convene a pre-installation conference to be attended by the Contractor, living wall system Subcontractor, manufacturer's technical representative, Architect and Owner to review:

.1 Technical representative's schedule for reviewing work.

.2 Product selections including finishes and samples required, installation accessories. Note: Plant materials and mock-ups will be presented prior to Phase II (planting) commencing.

.3 Procedures and tests for verifying acceptability of substrate for installation of products.

.4 Environmental requirements for installation.

.5 Installation procedures.

.6 Protection and care of finished installation.

1.3 SUBMITTALS

.1 Submittals shall be in accordance to Section 01 33 00 - Submittal procedures.

.2 Product Data: Provide data on accessories describing size, finish, and details of function, attachment methods.

.3 Shop Drawings:

.1 Indicate layout of profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Include layout and erection drawings, elevations, and details where applicable.

.2 Include a complete set of standard details for the panels, rooting material and mechanical components.

.3 Indicate requirements for plumbing and electrical.

.4 Include a plant list and design sketch (artwork).

.4 Installation Data: Manufacturer's special installation requirements including special procedures and perimeter conditions requiring special attention.

.5 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Documentation must address 100% of ingredients.

.4 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as “mixture” are not acceptable.

.1 Each components of a mixture shall be identified.

.5 Provide documentation as required for LEED Submittals:

.1 SS Credit 7.1 – Heat Island Reduction: Non-Roof

.2 SS Credit 8 – Light Pollution Reduction

.3 WE Credit 3 – Water Efficient Landscaping

.4 EA Credit 1 – Optimize Energy Efficiency Performance

1.5 QUALITY ASSURANCE

.1 Installer: Company specializing in living wall systems, having trained installers with a minimum of three (3) years proven experience for projects of similar size and complexity.

.2 Perform work in accordance with the printed requirements of the living wall designer and this specification. Advise Architect of any discrepancies prior to commencement of the Work. Start of Work shall imply acceptance of conditions.

.3 Maintain one copy of manufacturer’s literature on site throughout the execution of the Work.

.4 Ensure that the materials used in this Section including, internal diffusers, growth media, and vegetation shall be fully compatible with each other.

.5 Submit documentation clearly indicating legal right to use proprietary technologies included in this project.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in original, unopened containers of original packaging, clearly labelled with manufacturer's name, brand name, instruction for use, all identifying numbers, and related standards.

.2 Before installation, materials must be stored in a dry and ventilated shelter that protects against freezing, inclement weather and any and all harmful substances. It is recommended that in winter months, the material be stored inside, at a temperature no greater than 26° C and no cooler than 8°C.

.3 Plant materials must be stored in an area that will provide a healthy environment before installation at a temperature no greater than 26° C and no cooler than 15°C. Plants must be protected from direct sunlight. If the plants are to be stored for more than 3 days than the General Contractor must provide lighting (natural or artificial similar to lighting requirements specified.).

.4 If installation of the living wall plants is not performed within two (2) days of delivery to the site, the plants must be stored in an area adjacent to the Living Wall and watered every three to five days through the entire balance of the storage period. Manufacturer's representative must also be consulted about any additional instructions.

.5 Provide a staging area adjacent to the living wall for handling the plants during installation.

1.7 SITE CONDITIONS

.1 Comply with manufacturer's requirements regarding weather, substrate and other project conditions as specified in the Product Data Sheets.

.2 Environmental Requirements:

.1 Trench drain shall be clean of stains, debris and dirt, free from cracks in excess of 5 mm, and shall be free from protrusions, holes or uneven concrete or mortar greater than 10 mm.

.2 The wall shall be free of honey combing. Tolerance to imperfections in concrete work and structural wall must at least meet those outlined in Section 03 30 00 – Cast-in-Place Concrete.

.3 No installation of plants shall be performed if temperatures below 15°C or above 25°C

1.8 WARRANTY

.1 Defects in material (excluding plants) and workmanship for one (1) year after Substantial Performance.

.2 Non-moving parts of living wall infrastructure for five (5) years after Substantial Performance.

.3 Moving parts for one (1) year after Substantial Performance.

Part 2 Products

2.1 MANUFACTURER

.1 Acceptable Manufacturer:

.1 Green over Grey Inc.

2.2 OPERATION

.1 The living wall will function as a vertical hydroponic garden

.2 Drip irrigation pipes will deliver water evenly through the interior of the living wall.

.1 The water trickles down evenly through the interior of the living wall. Flag drippers will release 16 litres of water per hour and be added every 100 mm of pipe.

.2 Irrigation will take place at scheduled intervals during the day (up to 8 cycles) for a minute or two each time. The amount of watering will be adjusted according to the moisture requirements of the individual plants chosen.

.3 Air Cleaning System: The living wall to have the following air cleaning characteristics:

.1 Contaminant Removal:

.1 Removed contaminants shall be biologically oxidized within the living wall and shall not accumulate in the system.

2.3 MATERIALS

.1 Drains:

.1 Trench drains should be installed on both levels and drained to sewer, sanitary or other appropriate location.

.2 Trench drains must be at least 460 mm in width and run the full length of the living wall with an additional 100 mm – 150 mm on either end.

.3 Refer to Mechanical for drains specified.

.2 Rooting Media:

.1 Proprietary membranes:

.1 Capillary fabric, +/- 5mm thick

.2 Structural rooting membrane (+/- 2mm thick)

.3 Water System:

.1 Drip irrigation pipes

.2 The nutrients for the plants will be supplied via a waterline running through a (Dosmatic - Minidos) fertilizer injector.

.3 All plumbing shall be inert.

.1 Copper piping and fittings are to be avoided for all components.

.2 Piping within the living wall and used in association with the fertilizer injector will be IPEX schedule 40 CPVC, AquaTherm, PEX (or other accepted substitution by manufacturer). Fusing of pipes will be done according to the manufacturer’s recommendations.

.4 Piping within interior living walls with 20mm (3/4”) or 15mm (1/2”) domestic hot and cold water lines, with the following:

.1 60 psi

.2 The following irrigation/plumbing components are required, supplied by others:

.1 Pressure Regulator with drain

.2 Purge

.3 Ball Valves x 7 (+ number of zones)

.4 200 micron Mesh Filter x 2

.5 By-Pass Assembly with ball valves

.6 Fertilizer Injector

.7 Solenoid Valves feeding various zones, number to be confirmed by manufacturer

.8 Timer/Controller

.9 Nutrient reservoir

.10 Agitator pump

.3 There will be various stub out locations (depending on the number of zones required), to be confirmed with manufacturer

.5 All valves and solenoids installed by will be identified with tags by Division 22.

2.4 PLANTS

.1 The plants to be added will be pre-grown in pots.

.2 Plants will be bare rooted and transplanted in between the 2 layers of capillary fabric.

.3 The plants are selected for the following criteria:

.1 Drought tolerance and native to area of installation.

.2 Their ability to influence the performance of the living wall

.3 Their tolerance of the growth conditions of the hydroponic living wall

.4 Ability to match the environmental conditions surrounding the living wall

.5 Their aesthetic appeal.

2.5 LIGHTING

.1 Plant lighting supplier shall coordinate supplemental lighting requirements with Architect and Electrical Engineer to ensure total light levels are appropriate for plants selected.

2.6 FLASHING

.1 Optional stainless steel flashing details can be used at the left and right edges of the living wall.

Part 3 Execution

3.1 INSPECTION AND PREPARATION

.1 Ensure that the wall is easily accessible with no barriers obstructing access to the wall.

.1 Free access to the wall to allow for ladder or scissor lift/ operation. Trench/curb drains must be installed prior to installation of living wall.

.2 For installation and maintenance, a scissor lift must be able to drive up close to properly access the wall, if required.

.2 Starting the work will be taken to signify approval by the Installer of the work conditions.

.3 Prior to commencement of work, examine drains to ensure cleanliness and proper function. Remove any debris, equipment, and excess material from site prior to installation of system.

.4 Before beginning the installation, the Architect and manufacturer's representatives must inspect and approve the wall conditions, including the trench/curb drains, mechanical room, plumbing installation, lighting, etc, utility supplies, construction joints, etc.

.5 Ensure that all work by other Divisions has been duly completed.

3.2 INSTALLATION

.1 Ensure that during use of equipment and tools, water-tightness of the wall will not be compromised in any way.

.2 Install living wall system per manufacturer's instructions.

.3 Install and connect living wall irrigation system per manufacturer's instructions.

.4 The installer shall regularly clear the work site of any debris or other material that can hinder installation or system performance. When moving materials or installing the living wall system, protect exposed work surfaces to avoid damage. The contracted installer is fully responsible for any damage.

.5 During installation and after completion of installation, installer shall remove any debris, equipment, and excess material and shall ensure that drains are clean and functioning properly.

3.3 POST-INSTALLATION AND INSPECTION PERIOD

.1 Diligently follow Installer's guidelines for post installation maintenance of plants. Adhere to the maintenance schedule outlined in the manufacturer's maintenance guidelines.

.2 After the plants are installed in the living wall, ensure the building temperature remains between 15°C and 25°C.

3.4 LIVING WALL MAINTENANCE

.1 Provide a system to allow maintenance workers safe access to living wall. There shall be no obstacles impeding access (i.e. benches, tables, statues, etc)

.2 The maintenance program will commence as soon as the plants have been installed.

.3 The installation of the plants is to occur no earlier than 3 weeks before Substantial Performance of the building.

.4 The maintenance contractor will visit the site at least 12 times during the first 12 month period. Included in these visits are the following: maintenance of fertigation system, replacement of dead plants, pruning of plants, control of pest insects and maintenance of plant nutrient status.

.5 The maintenance contractor will submit maintenance reports to the Contractor prior to Substantial Performance, outlining the actions carried out as per the maintenance requirements above, as well as dates, personnel at each visit, and notes on growing conditions.

.6 Prior to Substantial Performance, reports shall be signed by maintenance contractor and verified by Owner.

.7 Prior to Substantial Performance, copies shall be submitted to Owner and Contractor.

3.5 CLEANING

.1 Perform cleaning during installation of the work and upon completion of the work.

.2 Remove all excess materials, debris and equipment from the site. Repair any damage that has resulted from installation.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Exterior sun control devices forming a part of the curtain wall glazing system and exterior cladding.

.2 Drawings contain details that suggest directions for solving some of the major design requirements; these details can be developed further during the Shop Drawing process provided that the final installation adheres to aesthetic criteria established by the Drawings and specified dimensions with all elements in planes as drawn, maintain their relationships with all other building elements.

.3 Related Sections

.1 Section 07 26 00 - Vapour and Air Retarders

.2 Section 07 42 23 - Wood Wall Panels

.3 Section 07 42 33 - Polycarbonate Panels

.4 Section 07 42 53 - Photovoltaic Façade Panels

.5 Section 07 44 53 - Glass-Fibre-Reinforced Cementitious Panels

.6 Section 07 92 00 – Sealants

.7 Section 08 44 12 - Composite Curtain Wall & Assemblies

1.2 REFERENCE

.1 Reference Standards:

.1 The Aluminum Association Inc. (AA)

.1 Aluminum Design Manual, 2000.

.2 Welding Aluminum: Theory and Practice, 2002.

.3 Properties of Aluminum Alloys: Tensile, Creep, and Fatigue Data at High and Low Temperatures, 1999.

.2 American Architectural Manufacturer’s Association (AAMA)

.1 AAMA 611-98, Voluntary Specification for Architectural Anodized Aluminum.

.2 AAMA AFPA-91, Anodic Finishes/Painted Aluminum.

.3 American Society for Testing and Materials International (ASTM)

.1 ASTM B209/209M-04, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.2 ASTM B221/221M-05, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.3 ASTM B429-02, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

.4 Canadian Standards Association (CSA)

.1 CSA W47.2-M1987 (R3003), Aluminum Welding Qualification Code.

.2 CSA W59.2-1991 (R2003), Welded Aluminum Construction.

.5 Canadian Welding Bureau (CWB Group Industry Services)

.1 CWB 112E, 93-1, Welding Symbols Study Guide.

.2 CWB 113E, 94-1, Weld Quality and Examination Methods Study Guide.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: coordinate installation of system with work specified in other Sections to ensure proper placement and installation of sealants and flashings in order that air, vapour and thermal barrier of building is intake and moisture will be diverted to the exterior, and as follows:

.1 Coordinate installation of sealant so that ambient and surface temperatures are greater than 5°C from time of application until sealants have cured.

.2 Coordinate Work of the Section with installation of fibreglass window components or materials.

.2 Pre-Construction Meeting: conduct a pre-construction meeting on site to review methods and procedures related to fibreglass windows including, but not limited to, the following:

.1 Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

.2 Review location and alignment of structural elements as they relate to requirements indicated on the shop drawings.

1.4 SUBMITTALS

.1 Provide required information in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data: submit product data indicating construction details, material descriptions, dimension of individual components and profiles, and finishes for each type of product indicated, in addition to the following specific requirements:

.1 Mechanical fasteners: indicate sizes, shear, and pull over loading capacity where applicable.

.2 Corrosion protection: indicate thickness and type of corrosion protection coating.

.3 Shop Drawings: submit shop drawings indicating all construction details including, but not limited to, the following:

.1 Connections and anchor requirements.

.2 Type, size and spacing of fastening devices.

.3 Design loads.

.4 Connections to structural framing

.5 Penetration to adjacent air and vapour membranes.

.6 Sealant locations.

.4 Samples: submit samples for each type of exposed finish required, in manufacturer's standard sized for Architect's verification of specified finishes.

.5 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.2 Provide two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

.1 Indicate VOCs for products and adhesives.

.2 VOCs shall be stated in g/L.

.3 Documentation must address 100% of ingredients.

.4 Provide complete ingredients list of products with a letter from the manufacturer testifying compliance with LBC Red List or non-compliance with Red List.

.1 Ingredients in the products shall be individually identified.

.2 Ingredients listed as “mixture” are not acceptable.

.1 Each components of a mixture shall be identified.

.5 Provide documentation as required for LEED Submittals:

.1 MR Credit 4 – Recycled Content

.6 Information Submittals: provide the following submittals when requested by the Architect:

.1 Certificates: submit evidence of welder qualifications specified in this Section when requested by Architect.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, handle and store units in accordance with manufacture’s directions.

.2 Store units at site on raised wood pallets protected for the elements and corrosive materials. Do not remove from crates or other protective covering until ready for installation.

.3 Store pre-fabricated frame assembled blocked off the ground to prevent warping, twisting, undue strain on assembly or physical abuse and damage.

1.6 SITE CONDITIONS

.1 Site measurements: verify dimension of other construction by site measurements before fabrication and indicate measurements on shop drawings where sun control devices are indicated to fit other construction.

.2 Established dimensions: establish dimension and proceed with fabricating sun control devices without site measurements where site measurements cannot be mad without delaying the Work, coordinate with other construction to ensure that actual dimension correspond to established dimensions.

1.7 WARRANTY

.1 Provide manufacturer’s written warranty, signed and issued in the name of Owner, to replace the following items for defective material and workmanship for the time stated from date of Substantial Performance:

.1 Framing and panels; failure of performance requirements specified in item 2.2.3.4 below; 2 years.

.2 Joint sealants, caulking: failure to maintain seal; 2 years.

.3 Aluminum brake shapes: oil-canning and delaminations; 2 years.

.4 Finishes: failure of specified finishes not attributable to normal weathering: 20 years.

Part 2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design: Following manufacturer and product used to establish the details for this Project:

.1 Kawneer Canada Inc., Versoleil™ SunShade – Outrigger System

2.2 PERFORMANCE REQUIREMENTS

.1 Connect sun control devices to structural connections within the wall system.

.2 Design sun control elements so that they do not affect continuity of adjacent building envelope elements.

.3 Design, engineer, test, fabricate, deliver, install and guaranty construction necessary to provide and install sun control devices including anchorage capable of withstanding without failure, the effect of the following:

.1 Structural loads.

.2 Environmental movements and performance.

.3 Movements of supporting structure including, but not limited to, long term creep and deflection from uniformly distributed and concentrated live loads.

.4 Failure of the system will be considered as:

.1 Deflection exceeding specified limits.

.2 Thermal stresses transferred to buildings structure.

.3 Noise or vibration created by wind, thermal and structural movements.

.4 Loosening or weakening of fasteners, attachments, and other components.

.5 Sealant failure.

.4 Design sun control devices systems to account for the following environmental conditions:

.1 Thermal movements:

.1 Allow for thermal movements resulting from the following maximum change (range) in ambient temperatures, accounting for surface temperatures of materials due to both solar heat gain and night time sky heat loss:

.2 Temperature change (range):

.1 Exterior ambient: -40°C to +35°C.

.2 Interior ambient: +16°C to +29°C.

.3 Adjust calculations to account for colour treatments or coatings on sun control device framing members.

.4 Allow for thermal movement with no buckling of members, excess stress on curtain wall framing, anchors and fasteners.

.2 Dead loads: account for weights of materials and construction accessories.

.3 Wind loads: 0.40 kPa 1/30 year occurrence in accordance with the Building Code.

.4 Deflection of framing members:

.1 Deflection normal to wall plane: limited to 1/175 of clear span for spans up to 4100 mm, and to 1/240 of clear span plus 6 mm for spans greater than 4100 mm or an amount that restricts edge deflection to 19 mm, whichever is less.

.2 Limit length of cantilever deflection to 2/175 length of the cantilevered member where framing members overhang an anchor point.

2.3 MATERIALS

.1 Aluminum: allow and temper recommended by manufacturer fro type of use and finish indicated, and as follows:

.1 Sheet and plate: ASTM B209.

.2 Extruded bars, rods, shapes, and tubes: ASTM B221.

.3 Extruded structural pipe and tubes: ASTM B429.

.4 Welding rods and bare electrodes: CSA w59.2.

.2 Brackets and reinforcements: manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

.3 Fasteners and accessories: manufacturer's standard corrosion resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials:

.1 Use self locking devices where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration.

.2 Reinforce members are required to receive fastener threads.

.3 Use only conceal fasters, unless use exposed fasteners has been accepted in writing by the Architect.

.4 Finish exposed portions to match fibreglass window framing system.

.5 Use slip joint linings, spacers, and sleeves at movement joints of material and type recommended by manufacturer.

.4 Concealed flashing: manufacturer's standard corrosion resistant, non-staining, non-bleeding flashing compatible with adjacent materials.

.5 Framing gaskets: as recommended by manufacturer for joint type.

.6 Framing sealants: as recommended by manufacturer for joint type.

2.4 SUN CONTROL DEVICES

.1 Provide sun control devices compatible with structure, cladding systems, composite curtain wall, and composite windows specified, and as follows:

.1 Outrigger profile: straight, square end.

.2 Blade profile: planar.

.1 Angle: 90 degrees

.3 Fascia profile: rectangular.

.4 Thickness: as required to support structural loads.

.5 Location: exterior windows as located on Drawings.

.6 Size and configuration: as indicated on Drawings.

2.5 FABRICATION

.1 Form aluminum shapes before finishing.

.2 Fabricate components that have the following characteristics when assembled:

.1 Sharp profiles, straight and free of defects or deformations.

.2 Accurately fitted joints with ends coped or mitred.

.3 Accommodations for thermal and mechanical movements.

.3 Weld in concealed location to greatest extent possible to minimize distortion or discolouration of finish; remove weld spatter and welding oxides from exposed surfaces by de-scaling or grinding.

.4 Clearly mark fabricated components to identify their locations in accordance with Shop Drawings.

2.6 ALUMINUM FINISHES

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation Systems for Aluminum Finish.

.1 Clear anodized.

.1 Class II finish: AA-M12 mechanical finish; C22 non-specular; A31 chemical finish, etched, medium matte anodic coating; Architectural Class II, clear coating 0.010 mm or thicker in accordance with AAMA 611.

Part 3 Execution

3.1 EXAMINATION

.1 Examine areas for compliance with requirements for installation tolerances and other conditions affection performance of work; report any conflicts or coordination issues to Architect.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

.1 Install in accordance with manufacturer's written instructions.

.2 Install components plumb and true to alignment with established lines.

.3 Install components free from damage or irregularities.

.4 Fit joints to produce hairline joints free of burrs and distortion.

.5 Rigidly secure non-movement joints.

.6 Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

.7 Weld components in concealed locations to minimize distortion or discolouration of finish:

.1 Protect glazing surfaces from welding.

.2 Protect work of other sections from welding.

.8 Seal joints watertight, except where manufacturer's standard details indicate a requirement for open joints.

.9 Metal protection:

.1 Protect aluminum against galvanic action by painting contact surfaces with primer, by applying sealant or tape, or installing nonconductive spacers where aluminum contacts dissimilar metals.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Installation and supply of floor grid system.

.2 Related Sections

.1 Section 03 30 00 – Cast-in-Place Concrete

.2 Section 03 35 00 – Concrete Finishing

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM B221-08, Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.2 ASTM D2047-04, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

.3 ASTM E648-10, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

.2 Carpet and Rug Institute (CRI)

.3 Environmental Testing Agency (EPA):

.1 Indoor Air Quality (IAQ) Design Tools for Schools, Controlling Pollutants and Sources.

.4 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102.2-10, Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

1.3 COORDINATION

.1 Coordinate recessed frame installation with Section 03 30 00, provide measurements for recess size and frame anchorage requirements necessary for installation of entrance grating and frame system.

.2 Coordinate top of grating surfaces with bottom of doors swinging across entrance gratings and frames, provide information to ensure clearance between grating without impinging operation of door.

.3 Coordinate delivery of entrance grating system with building enclosure to ensure that installation conditions are complete and related interior finish work is in progress.

1.4 SUBMITTALS

.1 Submittals shall be in accordance with Section 01 33 00 – Submittals Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheets for each floor grating and frame specified. Include manufacture’s installation instructions.

.3 Shop Drawings:

.1 Show layout of grating and frame including, but not limited to, details indicating construction relative to materials, direction of traffic, spline locations, profiles, anchors and accessories.

.4 Sustainable Design Submittals:

.1 Sustainable Design Submittals shall be in accordance with Section 01 35 60 - Sustainability Certification Requirements and Submittals.

.2 Provide documentation as required for LEED Submittals:

.1 MR Credit 4 – Recycled Content

.2 IEQ Credit 5 – Indoor Chemical and Pollutant Source Control

1.5 CLOSEOUT SUBMITTALS

.1 Submit closeout data in accordance with Section 01 78 00 – Closeout Submittals.

.1 Submit maintenance data: Include maintenance procedures, recommendations for maintenance materials and equipment, and suggested schedule for cleaning.

1.6 QUALITY ASSURANCE

.1 Obtain floor gratings and frames from single source by single manufacturer installed by personnel experienced in similar projects and complexity to that specified.

Part 2 Products

2.1 MANUFACTURES

.1 Acceptable Manufacturers: Subject to compliance with requirements specified in this Section, manufacturers offering products that may be incorporated into the Work include the following:

.1 Balco, Inc.

.2 Construction Specialties, Inc.

.3 K. N. Crowder Mfg. Inc.

.4 Reese Enterprises, Inc.

2.2 PERFORMANCE/DESIGN CRITERIA

.1 Flammability in accordance with ASTM E648, Class I, Critical Radiant Flux, minimum 0.45 watts/m^2.

.2 Slip resistance in accordance with ASTM D2047, Coefficient of Friction, minimum 0.60 for accessible routes tested in wet conditions.

.3 Standard rolling load performance using 125 mm Ø x 50 mm wide polyurethane wheel and 270 kg rolling load, no damage after 1000 pass.

.4 Floor Grid shall consist of a series of tread rails spaced 1 1/2" (38.1 mm) o.c. and running counter to the traffic flow.

.1 Maximum allowable load on FG Series floor grid shall be 300 psf uniform load.

.2 Floor Grid shall be FG Series and shall be removable and replaceable without disassembly of entire grid and without damage to grid.

.3 FG Series floor grids shall be provided with abrasive inserts.

.4 Floor Grids shall provide a uniform sightline.

.5 Floor grids shall allow debris to fall to sub-floor.

.6 FG Series Floor grid tread bars shall be separately removable and replaceable without disassembly of all tread bars.

.1 I-beam supports shall be mechanically fastened to the frame.

.2 I-beam supports shall run perpendicular to the tread rails.

.3 I-beam support legs shall run parallel to the tread rails.

2.3 MATERIALS

.1 Aluminum Sheet: Meeting requirements of ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of alloy 5005 H15.

.2 Extruded Aluminum: Meeting requirements of ASTM B221, alloy 6061 T6 or alloy 6063 T5, T6, or T52 as standard with manufacturer; coat surface of frame in contact with cementitious materials with manufacturer's standard protective coating.

2.4 MANUFACTURED UNITS

.1 Floor Grid Sysem: Manufacturer's standard recessed floor grating with extruded members, top surfaced tread rails with following nominal requirements:

.1 Tread Rails: Extruded aluminum flat tread rails.

.2 Tread Rail Spacing: 38 mm o/c with 3 mm to 5 mm wide openings between treads.

.3 Frame: extruded aluminum frame, mill finish

.4 Aluminum Finish: standard mill finish

.5 Abrasive: Two part Epoxy combined with aluminum oxide grit.

.6 Basis-of-Design: FG-1 1/2A, Balco Inc.

.2 Support System: Manufacturer’s standard as follows:

.1 Evaporation Pit Applications: Provide manufacturer's shallow pit frame and support extrusion system with intermediate support beams, sized and spaced as recommended by manufacturer

2.5 FABRICATION

.1 Shop fabricate floor gratings to greatest extent possible in sizes as indicated; provide each grating as a single unit; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning; space symmetrically and away from normal traffic lanes when joints in gratings are necessary.

.2 Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

2.6 ACCESSORIES

.1 Levelling compound: as accordance with Section 03 35 00 and as recommended by entrance grating manufacturer.

.2 Coat surfaces of aluminum frames that will contact cementitious material with manufacturer's standard protective coating.

Part 3 Execution

3.1 EXAMINATION

.1 Verify surfaces and conditions are ready to accept work of this Section. Should discrepancies be found which affect the proper performance of the work of this section, do not commence work until such discrepancies have been resolved.

3.2 PREPARATION

.1 Install levelling compound to screed level required for accurate recessed installation.

3.3 INSTALLATION

.1 Install entrance gratings in accordance with manufacturer’s written instructions.

.2 Install grating at height recommended by manufacturer for the most effective cleaning action.

.3 Coordinated top of grating surfaces with bottom of door swings to provide clearance between door and grating.

.4 Install entrance gratings immediately before declaration of Substantial Performance for the project and after construction traffic is completed.

.5 Install entrance grating and frame in removable sections for ease of maintenance by Owner.

3.4 CLEANING AND PROTECTION

.1 Clean tread surface and recessed well as frequently as possible to reduce the effects of accumulated soiling that may hinder performance and lifetime.

.2 After completing required frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and project is near time of substantial completion.

.3 Defer installation of floor grids until time of substantial completion of project.

3.5 DEMONSTRATION

.1 Train Owner’s designated maintenance personnel in the care and upkeep of entrance gratings and frames in accordance with Section 01 79 00 – Demonstration and Training.

.2 Demonstrate cleaning methods required to maintain entrance grating and frame system, based on estimated foot traffic requirements for the completed project.

END OF SECTION