Part 1 GENERAL GLAZED ALUMINUM CURTAIN WALLS

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 – Rough Carpentry.

.2 Section 07 21 29.03 – Sprayed insulation – Polyurethane foam.

.3 Section 07 26 00 – Vapour retarders and air barrier.

.4 Section 07 62 00 - Sheet metal flashing and trim.

.5 Section 07 84 00 – Firestopping.

.6 Section 07 92 00 - Joint Sealing.

.7 Section 08 71 00 – Door Hardware.

.8 Section 08 71 00-A1 – Door Hardware – Annex 1, Hardware groups

.9 Section 08 80 50 – Glazing.

1.2 REFERENCES

.1 Aluminum Association (AA)

.1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA)

.1 AAMA CW-10-15, Care and Handling of Architectural Aluminum From Shop to Site.

.2 AAMA CW-11-85, Design Wind Loads and Boundary Layer Wind Tunnel Testing.

.3 AAMA 501-05, Methods of Test for Exterior Walls.

.3 ASTM International

.1 ASTM A123/A123M-15, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A167-99(2009), Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.3 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.4 ASTM B209-14, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.5 ASTM B221-14, Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.6 ASTM D2240-15, Standard Test Method for Rubber Property—Durometer Hardness.

.7 ASTM E283-04(2012), Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.8 ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls, by Uniform Static Air Pressure Difference.

.9 ASTM E331-00(2009), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference.

.10 ASTM E547-00 (2009), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.

.11 ASTM E1105-15, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.108-M89, Bituminous Solvent Type Paint.

.2 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.

.5 CSA International

.1 CSA-S157/S157.1-F05, Strength Design in Aluminum.

.2 AAMA/WDMA/CSA-101/I.S.2/A440-11, NAFS - North american fenestration standard/Specification for windows, doors, and skylights.

.3 CSA W59-13, Welded steel construction (metal arc welding).

.6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1 SCAQMD Rule 1113, Architectural Coatings.

.7 Underwriter’s Laboratories of Canada (ULC)

.1 CAN/ULC-S710.1-11, Standard for Thermal Insulation – Bead-Applied One Component Polyurethane Air Sealant Foam, Part 1: Material Specification.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Co-ordination: co-ordinate work of this Section with installation of fire stopping, air barrier placement, vapour retarder placement, flashing placement, installing ductwork to rear of louvres, components or materials with Section 07 26 00 - Vapour retarders and air barrier.

.2 Pre-Installation Meetings:

.1 Convene pre-installation meeting 1 week prior to beginning work of this Section on-site installation, with Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's written installation instructions and warranty requirements.

.3 Arrange for site visit with Departmental Representative prior to start of Work to examine existing site conditions adjacent to demolition Work.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for curtain wall components, anchorage and fasteners, glass and infill, and internal drainage details and include product characteristics, performance criteria, physical size, finish and limitations and water flow diagrams.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Quebec, Canada.

.2 Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anchor details anticipated deflection under load, affected related Work, weep drainage network, expansion and contraction joint location and details, and field welding required.

.3 Indicate scope and location of earthquake protections. Include calculations of earthquake protection design.

.4 Samples:

.1 Submit copies in duplicate, for review and acceptance, of sample sections of curtain wall, 300 mm x 300 mm, showing surface, finish, colour and texture of prefinished aluminum, including a section of infill panel.

.2 Submit 2 samples 300 mm x 300 mm in size illustrating prefinished aluminum surface, finish, colour, texture, specified glass units, insulated infill panels, glazing materials illustrating edge and corner.

.5 Test Reports:

.1 Submit substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and supportive data.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazed aluminum curtain wall for incorporation into manual.

1.6 QUALITY ASSURANCE

.1 Mock-ups:

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

.2 Produce work sample of an insulated gatehouse showing intermediate mullions, corner mullions, window mullions, column coverings, glazed surfaces, insulated infill panels, and doors.

.1 Mock up shall be of a typical window bay size.

.2 Mockup to be assembled to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.

.3 Locate mock-up where indicated by Departmental Representative.

.4 Allow 5 working days for inspection of mock-up by Departmental Representative before proceeding with work.

.5 When accepted, mock-up will demonstrate minimum standard of quality and materials for work of this Section.

.6 Mock-up may not remain as part of finished work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Handle work of this Section in accordance with AAMA CW-10.

.2 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.3 Store and protect aluminum glazed curtain wall components from nicks, scratches, and blemishes.

.4 Protect prefinished aluminum surfaces with wrapping strippable coating. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

.5 Replace defective or damaged materials with new.

1.8 AMBIENT CONDITIONS

.1 Install sealants when ambient and surface temperature is above 5 degrees C minimum.

.2 Maintain this minimum temperature during and for 48 hours minimum after installation of sealants.

1.9 EXTENDED WARRANTY

.1 Contractor hereby warrants that glazed aluminum curtain wall will function as specified in accordance with CCDC 24, but for 120 months.

.2 Provide a written document jointly prepared and signed by the manufacturer and the installer and issued in the name of Canada, ensuring the work against defects in materials, workmanship and installation for the period specified above.

Part 2 Products

2.1 SYSTEMS

.1 Description:

.1 Glazed aluminum four sided pin curtain wall system, includes tubular aluminum sections, verticals in two coupling sections and screws and grooves horizontal elements, allowing for ladder shop assembly. Vision glass, insulated metal panel spandrel infill, swinging or sliding doors, column covers, and louvres; related flashings, anchorage and attachment devices.

.2 Sloped glazing system includes thermally broken tubular aluminum sections with self supporting supplementary support framing, shop fabricated, factory prefinished, vision glass plastic, insulated metal panel infill; related flashings, anchorage and attachment devices.

.3 Assembled system to permit re-glazing of individual glass (and infill panel) units from interior exterior without requiring removal of structural mullion sections.

.2 Performance Requirements:

.1 Design and size components to withstand dead and live loads caused by pressure and suction of wind, acting normal to plane of system as calculated in accordance with NBC.

.2 Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable codes.

.3 Limit mullion deflection to L/175 to ASTM E330 or to a maximum of 14 mm, with full recovery of glazing materials.

.4 Size glass units and glass dimensions to limits established in CAN/CGSB-12.20.

.5 Ensure system is designed to accommodate the following without damage to components or deterioration of seals.

.1 Movement within system.

.2 Movement between system and perimeter framing components.

.3 Dynamic loading and release of loads.

.4 Deflection of structural support framing.

.6 Thermal Resistance and transmission of

.1 Heat transfer coefficient: Glazing and frame shall present a heat transfer coefficient (U) not exceeding:

.1 Winter: 1,363 W/m²K.

.2 Summer: 1,192 W/m²K.

.2 Spandrel panels: RSI value of at least 4.16 for purlins of typical depth.

.7 Condensation resistance to the frame the thermal performance is in accordance with AAMA 1503 a Condensation Resistance Factor ("condensation resistance factor" or CRF) greater than 70.

.8 Limit air infiltration through assembly to 0.0003 m³/s/m² of wall area, measured at a reference differential pressure across assembly of 75 Pa as measured in accordance with ASTM E283.

.9 Vapour seal with interior atmospheric pressure of 25 mm sp, 22 degrees C, 40% RH: no failure

.10 Water leakage: none, when measured to ASTM E331 and ASTM E547, at differential pressure of 720 Pa applied to entire panel.

.11 Ensure system allows for expansion and contraction within system components when temperature range is 95 degrees C over 12 hour period without causing detrimental affect to system components.

.12 Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.

.13 Maintain continuous air barrier and vapour retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.

.1 Position thermal insulation on exterior surface of air barrier and vapour retarder.

.14 Ensure no vibration harmonics, wind whistles, noises caused by thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system occur.

2.2 MATERIALS

.1 Extruded aluminum: to ASTM B221 alloy 6063.

.1 Finishing coats: To AAMA 2605 and AA DAF 45 Architectural Class I, clear anodized finish, minimum thickness 18 μm.

.2 Sheet aluminum: to ASTM B209, utility category, clear anodized finish, 1588 mm thick.

.3 Sheet steel: 0.952 mm thick, in accordance with ASTM A653/A653M, galvanized at 458 g/m^2 with corners sealed in concealed areas.

.4 Steel sections: to ASTM A167, Type 304 stainless]; shaped to suit mullion sections.

.5 Anchors: 3-way adjustable hot-dip galvanized cast iron.

.6 Fasteners: stainless cadmium plate.

.7 Bituminous paint: to CAN/CGSB 1.108-M89, Type 1, without thinner.

.8 Insulated glazing panels:

.1 Refer to section 08 80 50 – Glazing.

.9 Fire safety material : refer to section 07 84 00 - Fire Stopping.

.10 Sealant:

.1 Sealant and structural sealant: refer to Section 07 92 00 – Joint Sealants.

.2 Sealing joints: EPDM compatible with silicone or extruded silicone, in accordance with limitations and restrictions in guideline DCC-045 regarding chemical composition.

.3 Supporting blocks: Neoprene, to CCD-45 and ASTM D2240, Shore A hardness 80 to 90 on durometer.

.4 Insulation: Single-constituent liquid foam hardening in moisture, low expansion level of sprayed foam in place. Product in accordance with ULC - S710.1 and manufacturer’s written recommendations

2.3 COMPONENTS

.1 Mullion profile

.1 Nominal dimension:

.1 Type 1: 50 mm x 63 mm.

.2 Type 2: 75 mm x 63 mm.

.3 Type 3: 100 mm x 63 mm.

.2 Thermal break with interior tubular frames insulated from exterior support plates.

.3 Matching stops and pressure plate of sufficient size and strength to ensure adequate bite on glass and infill panels.

.4 Drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system.

.5 Internal mullion baffles to eliminate "stack effect" air movement within internal spaces.

.2 Covers: Pressure plate and snap lids

.1 System 1:

.1 Clear anodized extruded aluminum perimeter only.

.2 Depth of seal 19 mm.

.3 Joints vertical and horizontal structural silicone on the joints (except the perimeter).

.4 Ensure mullions caps are free of gaps.

.2 System 1 (exterior wall):

.1 Perimeter :

.1 Clear anodised extruded aluminum.

.2 Cap depth : 19 mm.

.3 Assure that cap are tighly installed.

.2 Other locations :

.1 Horizontal and vertical structural silicone joints.

.2 No pressure plate required.

.3 System 2:

.1 Clear anodized extruded aluminum.

.2 Depth of seal 19 mm on all mullions.

.3 Infill panel: internally reinforced, glazing edge sealed permitting internal air movement to glazing space, outside air barrier line

.1 Outer face: refer to section 08 80 50 - Glazing.

.2 Core: insulation: IR2 projected insulation. Refer to Section 07 21 29.03 – Sprayed Insulation – Polyurethane Foam.

.1 Thickness: Minimum 75 mm and 100 mm, depending on depth of mullions.

.3 Inner face:

.1 Non apparent: galvanized steel

.2 Apparent: aluminum 1.6 mm thick.

.4 Aluminum doors

.1 Doors: Made of hollow extruded sections of at least 3 mm wall thickness.

.1 Type 1:

.1 Uprights: Nominal width of 63.5 mm.

.2 Top rail: Nominal width of 63.5 mm.

.3 Bottom rail: Nominal width of 98.4 mm.

.1 Type 2:

.1 Uprights: Nominal width of 63.5 mm.

.2 Top rail: Nominal width of 63.5 mm.

.3 Bottom rail: Nominal width of 300 mm.

.2 Mechanically interlocked corner joints: Reinforced for greater sturdiness.

.3 Glazing beads: Set by simple pressure for glazing without putty. Glazing beads on outer side: Tamper-resistant.

.4 Outside doors: Thermal break.

.5 For supply of finishing hardware, refer to nomenclature of hardware items for doors and frames and to Section 08 71 00 – Door Hardware.

.5 Apron: Aluminum extrusion in dipped 6063-T5 alloy, frame as indicated in drawings. Minimum depth to ensure projection of at least 30 mm with underlying coating.

.1 Anchor and staple device of extruded aluminum, pre-drilled to receive fasteners.

.2 Finish: Exposed surfaces of aluminum constituents must be finished in accordance with Designation System for Aluminum Finishes, published by Aluminum Association.

.3 Natural anodized finished, Class 1, designation AA-M12C22A41.

.6 Vapour retarder: specified in Section 07 26 00 - Vapour Retarders

.7 Air barrier: specified in Section 07 27 00.01 - Air Barriers - Descriptive or Proprietary.

2.4 FABRICATION

.1 Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

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

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

.4 Arrange fasteners and attachments to ensure concealment from view.

.5 Door frames: to be made in curtain wall system. Mullions supporting doors and their hardware must contain vertical steel reinforcements.

.6 Sub-frame to be integrated in curtain-wall to receive doors.

.7 Prepare system components to receive exterior doors and hardware specified in Section 08 71 00 – Door Hardware.

.8 Reinforce interior horizontal head rail to receive track brackets and attachments.

.9 Reinforce framing members for external imposed loads.

.10 Visible manufacturer's identification labels not permitted.

.11 Doors:

.1 Doors and frames must come from same manufacturer.

.2 Doors and frames must be made in maximum frontal dimensions and profiles indicated. For insulating glass, rabbet must be at least 22 mm wide.

.3 If necessary, doors and frames must be equipped with structural steel braces.

.4 Joints of units must be tight and maintained by mechanical means.

.5 Fasteners must be concealed.

.6 To receive hardware, doors, frames and braces must be grooved, reinforced, drilled and threaded at required places, using templates set out in Section 08 71 00 – Door Hardware.

.7 Aluminum surfaces in direct contact with dissimilar metal surfaces, concrete surfaces or masonry surfaces must be covered with insulation coating.

.12 Infill panels

.1 Infill panels must be equipped with metal-coated protective liners on all edges to allow for application and movement of peripheral seals.

.2 Inner face of façade panels must be reinforced to prevent deflection from effects of wind and suction.

.3 Joints and angles of units must be adjusted precisely and then secured firmly. Joints must be tight, flush and weatherproof.

.4 Insulating material placed inside panels must be secured by fasteners welded to outer wall of inner panels. Impale insulation on fasteners.

.5 Ventilation and pressure equalization in air spaces must be ensured toward outer face of insulating material.

.6 Fasteners and accessories must not be exposed.

.13 Finishes

.1 Finish coatings: conform to AAMA 612 AA.

.2 Exterior exposed aluminum surfaces: to AAMA Class 1, A41 anodized to 215-R1, clear, de 0,7 mm thickness, pre-treatment.

.3 Interior exposed aluminum surfaces: to AAMA A41, anodized to 215-R1, clear, de 0,18 mm thickness.

.4 Shop and touch-up primer for steel components: SSPC 25 Paint red oxide.

.5 Touch-up primer for galvanized steel surfaces: SSPC 20 Paint zinc rich.

.6 Concealed steel items: galvanized in accordance with ASTM A123 600 g/m².

.7 Apply 1 coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

.1 VOC limit of 200 g/L, maximum to SCAQMD Rule 1113.

2.5 SOURCE QUALITY CONTROL

.1 Perform work in accordance with AAMA GSM-1 AAMA CW-I-9. Maintain 1 copy on site.

.2 Manufacturer qualifications: company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.

.3 Design structural support framing components to CAN/CSA-S157 under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the Province of Quebec.

.4 Perform welding Work in accordance with CSA W59.2.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for aluminum curtain wall installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Verify dimensions, tolerances, and method of attachment with other work.
- .3 Verify wall openings and adjoining air barrier and vapour retarder materials are ready to receive work of this Section.
- .4 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed Departmental Representative.

3.2 INSTALLATION

.1 Install curtain wall and sloped glazing system in accordance with manufacturer's instructions.

.2 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

.3 Use 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 Use thermal isolation where components penetrate or disrupt building insulation.

.6 Install sill flashings.

.7 Co-ordinate installation of fire stop insulation, specified in Section 07 84 00 - Fire Stopping, at each floor slab edge and intersection with vertical construction where indicated.

.8 Co-ordinate attachment and seal of perimeter air barrier and vapour retarder materials.

.9 Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

.10 Install fire-safing in areas as indicated.

.11 Install perimeter sealant to method required to achieve performance criteria. Sealant, backing materials, and installation criteria in accordance with Section 07 92 00 - Joint Sealants.

3.3 SITE TOLERANCES

.1 Maximum variation from plumb: 1.5 mm/m non-cumulative or 12 mm/30 m, whichever is less.

.2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.

.3 Maximum sealant space between curtain wall and adjacent construction: 13 mm.

3.4 FIELD QUALITY CONTROL

.1 Inspection by independent testing agency will monitor quality of installation and glazing.

.1 Test system to: ASTM E1105, AAMA 501.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer of curtain wall or glass verifying compliance of Work, in handling, installing, applying, protecting and cleaning of products, and submit written reports in acceptable format to verify compliance of Work with Contract within 3 days of review.

.2 Submit manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Ensure manufacturer's representative of curtain wall of glass is present before and during critical periods of installation construction of field joints testing.

.4 Schedule site visits to review Work at stages listed:

.1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.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.

.5 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by glazed aluminum curtain wall installation.

END OF SECTION