

1 General

1.1 RELATED SECTIONS

- .1 Section 04 05 00 - Common Work Results for Masonry.
- .2 Section 04 05 10 - Masonry Mortaring and Grouting.
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .4 Section 04 05 23 - Masonry Accessories.
- .5 Section 04 22 00 - Concrete Unit Masonry.
- .6 Section 05 50 00 - Metal Fabrications.
- .7 Section 07 21 19.13 - Foamed-in-Place Urethane Insulation.
- .8 Section 07 27 00 - Air Barriers.
- .9 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .10 Section 07 92 00 - Joint Sealants.
- .11 Section 08 12 13 - Hollow Metal Frames.
- .12 Section 08 51 13 - Aluminum Windows.

1.2 REFERENCES

- .1 ASTM C67/C67M-23a: Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
- .2 ASTM C216-21: Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
- .3 CAN/CSA-A371-14 (R2019): Masonry Construction for Buildings.
- .4 CSA S304-14: Design of Masonry Structures.

1.3 SOURCE QUALITY CONTROL SUBMITTALS

- .1 Submit source quality control samples as specified in Section 01 40 00.
- .2 Verification Samples: To ASTM C67/C67M.

1.4 MOCK-UPS

- .1 Supply Product for construction of mock-up panel as specified in Section 04 05 00.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 04 05 00.

1.6 AMBIENT CONDITIONS

- .1 Environmental Requirements: As specified in Section 04 05 00.

2 Products

2.1 MANUFACTURERS

- .1 Substitution Procedures: Refer to Section 01 25 00.

2.2 MATERIALS

- .1 Clay Brick: To ASTM C216, Type FBS, Grade SW; burned clay brick with 57 mm face height, 194 mm face length, and 92 mm bed depth; surface texture on exposed sides and ends; special shapes and profiles as indicated on Drawings; types as follows:
 - .1 BR-1: Concord Blend by The Belden Brick Company.
 - .2 BR-2: Sienna Blend Velour by The Belden Brick Company.
- .2 Veneer Mortar: As specified in Section 04 05 10.
- .3 Reinforcement and Anchorages: As specified in Section 04 05 19.
- .4 Accessories: As specified in Section 04 05 23.
- .5 Cavity Wall Insulation: Foamed-in-place urethane insulation, Type INS-FIP-1 as specified in Section 07 21 19.13.

2.3 SOURCE QUALITY CONTROL

- .1 Perform laboratory testing as specified in Section 01 40 00.
- .2 Test brick to ASTM C67/C67M.

3 Execution

3.1 PREPARATION

- .1 Secure wall ties to structural back-up for veneer as specified in Section 04 05 19.
- .2 Install masonry flashing as specified in Section 04 05 23.
- .3 Install loose steel lintels as scheduled and as specified in Section 04 05 00.

3.2 INSTALLATION

- .1 Place masonry veneer to lines and levels indicated, as specified in Section 04 05 00.
- .2 Lay brick in half-running bond.
- .3 Maintain 10 mm wide mortar joints in both directions.
- .4 Install masonry accessories as specified in Section 04 05 23.
- .5 Provide vertical and horizontal movement joints as specified in Section 04 05 23.

3.3 TOLERANCES

- .1 Variation from Unit to Adjacent Unit: ≤ 1.5 mm.
- .2 Variation of Joint Thickness: ≤ 3 mm per 1 000 mm.

3.4 FIELD QUALITY CONTROL

- .1 Refer to Section 01 40 00.
- .2 Consultant Inspection: Consultant will inspect completed masonry walls and will reject walls that have chipped, cracked or blemished (streaked, stained or otherwise damaged) finished surfaces, as described below.
 - .1 Masonry walls will be inspected to be free of chips, cracks or other blemishes on finished face or front edges exceeding 10 mm or that can be seen from a distance of 3 000 mm.
 - .2 Masonry shall exhibit a texture approximately equal to approved sample when viewed under diffused daylight illumination from a distance of 6 000 mm.

- .3 Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under diffused daylight illumination from a distance of 6 000 mm.
- .4 Craze and efflorescence will not be cause for rejection.

.3 Make Good rejected Products as directed by Consultant.

3.5 CLEANING

- .1 Clean masonry as specified in Section 04 05 00.

3.6 PROTECTION

- .1 Protect completed installation from damage resulting from subsequent construction operations. Refer to Section 04 05 00.
- .2 Remove protection materials upon Ready-for-Takeover, or when risk of damage is no longer present.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 05 00 - Common Work Results for Masonry.
- .2 Section 04 05 10 - Masonry Mortaring and Grouting.
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .4 Section 04 05 23 - Masonry Accessories.
- .5 Section 04 21 00 - Clay Unit Masonry.
- .6 Section 05 50 00 - Metal Fabrications.
- .7 Section 07 21 00 - Thermal Insulation.
- .8 Section 07 21 19.13 - Foamed-in-Place Urethane Insulation.
- .9 Section 07 27 00 - Air Barriers.
- .10 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .11 Section 07 92 00 - Joint Sealants.
- .12 Section 08 12 13 - Hollow Metal Frames.
- .13 Section 08 51 13 - Aluminum Windows.
- .14 Section 09 90 00 - Painting and Coating.
- .15 Section 11 66 23 - Gymnasium Equipment.

1.2 REFERENCES

- .1 ASTM C331/C331M-23: Standard Specification for Lightweight Aggregates for Concrete Masonry Units.
- .2 CSA A165 SERIES-14 (R2019): CSA Standards on Concrete Masonry Units.
- .3 CAN/CSA-A371-14 (R2019): Masonry Construction for Buildings.
- .4 CSA S304-14: Design of Masonry Structures.

1.3 SOURCE QUALITY CONTROL SUBMITTALS

- .1 Submit source quality control samples as specified in Section 01 40 00.
- .2 Verification Samples: To CSA S304.

1.4 QUALIFICATIONS

- .1 Manufacturer: A firm specializing in manufacturing concrete masonry units, having minimum 5 years documented experience and a member of CCMFA.

1.5 MOCK-UPS

- .1 Supply Product for construction of mock-up panel as specified in Section 04 05 00.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 04 05 00.

1.7 AMBIENT CONDITIONS

- .1 Environmental Requirements: As specified in Section 04 05 00.

2 Products

2.1 MATERIALS

- .1 Concrete Masonry Units - Normal Weight (CMU): To CSA A165.1, using N aggregate; 190 mm face height, 390 mm face length, bed depth as indicated on Drawings; solid factory-finished ends with bull nosed corners for use at exposed wall corners, special shapes as required; types where indicated on Drawings, as follows:
 - .1 Hollow: Types H/15/A/M, H/20/A/M and H/30/A/M.
 - .2 Solid (75 percent): Types S/15/A/M, S/20/A/M and S/30/A/M.
 - .3 Solid (100 percent): Types S_r/15/A/M, S_r/20/A/M and S_r/30/A/M.
- .2 Concrete Masonry Units - Lightweight (CMU-LWT): To CSA A165.1, using L₂20S slag aggregate to ASTM C331/C331M; 190 mm face height, 390 mm face length, bed depth as indicated on Drawings; solid factory-finished ends with bull nosed corners for use at exposed wall corners, special shapes as required; types where indicated on Drawings, as follows:
 - .1 Hollow: Types H/15/C/M, H/20/C/M and H/30/C/M.
 - .2 Solid (75 percent): Types S/15/C/M, S/20/C/M and S/30/C/M.
 - .3 Solid (100 percent): Types S_r/15/C/M, S_r/20/C/M and S_r/30/C/M.
- .3 Concrete Masonry Units - Acoustic (CMU-ACU): To CSA A165.1; 190 mm face height, 390 mm long, bed depth as indicated on Drawings; using L₂20S slag aggregate to ASTM C331/C331M, Type H/15/C/M; skewed and sloped face edged by two 90 degree linear profiles, with fibrous sound dampening filler; eg. Sound Cell by Richvale York Block Inc.

2.2 ACCESSORIES

- .1 Mortar and Grout: As specified in Section 04 05 10.
- .2 Horizontal Joint Reinforcement: As specified in Section 04 05 19.
- .3 Reinforcing Steel: As specified in Section 04 05 19.
- .4 Wall Ties: As specified in Section 04 05 19.
- .5 Strap Anchors: As specified in Section 04 05 19.
- .6 Masonry Accessories: As specified in Section 04 05 23.
- .7 Cavity Wall Insulation: As specified in Section 07 21 19.13.

2.3 SOURCE QUALITY CONTROL

- .1 Perform laboratory testing of concrete masonry units, as specified in Section 01 40 00.
- .2 Conduct compressive strength tests and water absorption tests to CSA S304.

3 Execution

3.1 INSTALLATION

- .1 Place masonry to lines and levels indicated, as specified in Section 04 05 00.
- .2 Except as specified below, lay concrete masonry units in half-running bond.
 - .1 Lay acoustical concrete masonry units in stacked bond.

- .3 Maintain 10 mm wide mortar joints in both directions.
- .4 Provide purpose made pilaster units, 90 and 45 degree corner return units, bullnose units, bond beam units, lintel units as required.
- .5 Provide bullnose concrete masonry units at all exposed corners, except at the first course at floor level and at the corresponding course located at the ceiling level.
- .6 Fully bond intersections, and external corners.
- .7 Extend and laterally support non-loadbearing partitions to underside of structural deck above. Maintain a minimum deflection space at the top of partitions as follows:
 - .1 Partition parallel to structural assembly: 44 mm.
 - .2 Partition perpendicular to structural member: 19 mm.
 - .3 Structural member penetrates partition: 19 mm.
 - .4 Ducts or piping supported from structural assembly that penetrate the partition: 19 mm.
 - .5 Fill deflection space with mineral fibre sound attenuating insulation.
- .8 Place horizontal joint reinforcement as specified in Section 04 05 19.
- .9 Install masonry flashings as specified in Section 04 05 23.
- .10 Install loose steel lintels as specified in Section 04 05 00.
- .11 Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled. Construct lintels using grout fill and reinforcing. Maintain minimum 200 mm bearing on each side of opening.
- .12 Reinforce bond beams and pilasters as indicated on Drawings. Place and consolidate grout fill without disturbing reinforcing.
- .13 At bearing points, fill masonry cores with grout minimum 300 mm from opening.
- .14 Provide vertical and horizontal movement joints and control joints as specified in Section 04 05 23.
- .15 Ensure cores of acoustical concrete masonry units remain free of mortar to maintain sound transmission and noise reduction capabilities.

3.2 TOLERANCES

- .1 Variation from Unit to Adjacent Unit: ≤ 1.5 mm.
- .2 Variation of Joint Thickness: ≤ 3 mm per 1 000 mm.

3.3 FIELD QUALITY CONTROL

- .1 Refer to Section 01 40 00.
- .2 Consultant Inspection: Consultant will inspect completed masonry walls and will reject walls that have chipped, cracked or blemished (streaked, stained or otherwise damaged) surfaces, as described below.
 - .1 Masonry walls will be inspected to be free of chips, cracks or other blemishes on finished face or front edges exceeding 10 mm or that can be seen from a distance of 3 000 mm.
 - .2 Masonry shall exhibit a texture approximately equal to approved sample when viewed under diffused daylight illumination from a distance of 6 000 mm.
 - .3 Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under diffused daylight illumination from a distance of 6 000 mm.
 - .4 Cracking and efflorescence will not be cause for rejection.
- .3 Make Good rejected Products as directed by Consultant.

3.4 CLEANING

- .1 Clean masonry as specified in Section 04 05 00.

3.5 PROTECTION

- .1 Protect concrete masonry units from damage resulting from subsequent construction operations. Refer to Section 04 05 00.
- .2 Remove protection materials upon Ready-for-Takeover, or when risk of damage is no longer present.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 22 00 - Concrete Unit Masonry.
- .2 Section 05 51 00 - Metal Stairs.
- .3 Section 07 84 00 - Firestopping.
- .4 Section 09 90 00 - Painting and Coating.
- .5 Section 32 13 13 - Concrete Paving.

1.2 REFERENCES

- .1 AAMA 611-20: Voluntary Specification for Anodized Architectural Aluminum.
- .2 AAMA 2604-22: Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (With Coil Coating Appendix).
- .3 AAMA 2605-22: Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (With Coil Coating Appendix).
- .4 ASTM A123/A123M-17: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .5 ASTM A153/A153M-23: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .6 ASTM A240/A240M-22b: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .7 ASTM A269/A269M-22: Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .8 ASTM A276/A276M-17: Standard Specification for Stainless Steel Bars and Shapes.
- .9 ASTM A307-21: Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
- .10 ASTM A385/A385M-22: Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
- .11 ASTM A449-14(2020): Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use.
- .12 ASTM A563/A563M-21a: Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric).
- .13 ASTM A653/A653M-23: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .14 ASTM A780/A780M-09(2015): Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- .15 ASTM A1008/A1008M-23e1: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.
- .16 ASTM B209/B209M-21a: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

- .17 ASTM B221M-21: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
- .18 ASTM D6386-22: Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
- .19 ASTM D7803-19: Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Powder Coating.
- .20 ASTM F436/F436M-19: Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
- .21 ASTM F467M-06a(2012): Standard Specification for Nonferrous Nuts for General Use (Metric).
- .22 ASTM F468M-06(2012): Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use (Metric).
- .23 ASTM F593-22: Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
- .24 ASTM F594-22: Standard Specification for Stainless Steel Nuts.
- .25 ASTM F3125/F3125M-23: Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
- .26 CSA A500-16: Building Guards.
- .27 CSA G40.20-13 (R2018): General Requirements for Rolled or Welded Structural Quality Steel.
- .28 CSA G40.21-13 (R2018): Structural Quality Steel.
- .29 CSA S136-16: North American Specification for the Design of Cold-Formed Steel Structural Members.
- .30 CSA W47.1:19: Certification of Companies for Fusion Welding of Steel.
- .31 CSA W47.2-11 (R2020): Certification of Companies for Fusion Welding of Aluminum.
- .32 CSA W55.3-08 (R2018): Certification of Companies for Resistance Welding of Steel and Aluminum.
- .33 CSA W59-18: Welded Steel Construction (Metal Arc Welding).
- .34 CSA W59.2-M1991 (R2018): Welded Aluminum Construction.

1.3 SHOP DRAWINGS

- .1 Submit Shop Drawings as specified in Section 01 33 00.
- .2 Shop Drawings: Project-specific drawings, prepared for each required custom-fabricated metal item, illustrating profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
- .3 Shop Drawings for metal ladders, balustrades, guards, railings and handrails must be stamped, signed and dated by fabricator's design engineer.

1.4 QUALIFICATIONS

- .1 Fabricator's Design Engineer: A professional structural engineer experienced in designing metal ladders, balustrades, guards, railings and handrails, licensed to practice at Place of the Work.
- .2 Fabricator: A firm specializing in fabricating custom metal components, having minimum 3 years documented experience.
- .3 Welders: Workers certified by CWB to CSA W47.1, CSA W47.2 and CSA W55.3; as applicable.

2 Products

2.1 DESIGN CRITERIA

- .1 Design cold-formed steel fabrications to CSA S136.
- .2 Design metal guards, including balustrades, railings and handrails to CSA A500 and applicable regulatory requirements, and capable of resisting:
 - .1 Uniform Load = 0.75 kN/m in any direction.
 - .2 Vertical Load = 1.5 kN/m.
 - .3 Loads on Pickets = 0.5 kN on 100 x 100 mm area.
 - .4 Non-concurrent Loads on Handrails = 0.9 kN applied at any point in any direction.
 - .5 Lateral Force = 1.0 kN at any point without damage or permanent set.
- .3 Design galvanized metal fabrications to accommodate venting and drainage during hot dip galvanizing process, to ASTM A385/A385M.

2.2 MATERIALS

- .1 Galvanized Sheet Steel: To ASTM A653/A653M, Structural Steel (SS) Grade 230, Types 1 and 2; cold-rolled sheet steel, galvanized; thicknesses as indicated.
- .2 Sheet Steel: To ASTM A1008/A1008M, Structural Steel (SS) Grade 230, Types 1 and 2; cold-rolled sheet steel, thicknesses as indicated.
- .3 Steel Sections and Plates: To CSA G40.20 and CSA G40.21, Grade 300W; profiles and sizes as indicated.
- .4 Hollow Structural Steel Sections: To CSA G40.20 and CSA G40.21, Grade 350W, Class H; sizes as indicated.
- .5 Stainless Steel Sheet, Sections and Plates: To ASTM A240/A240M, Type 304L for welded applications and Type 304 for other applications; thicknesses and sizes as indicated.
- .6 Stainless Steel Tubing: To ASTM A269/A269M, Grade TP316L; thicknesses, diameters and sizes as indicated.
- .7 Stainless Steel Bars and Shapes: To ASTM A276/A276M, Type 304L for welded applications and Type 304 for other applications; sizes and profiles as indicated.
- .8 Extruded Aluminum: To ASTM B221M, 6063 alloy, T6 temper; profiles and sizes as indicated.
- .9 Aluminum Sheet: To ASTM B209/B209M, 3003-H14 alloy for shop-painted or unfinished material and 5005-H32 alloy for anodized material; thicknesses as indicated.

2.3 MANUFACTURED UNITS

- .1 Checker Plate: To CSA G40.20 and CSA G40.21; 6.4 mm thick steel plate, with 1.27 mm raised checker pattern.

- .2 Welded Metal Grating: 4.8 mm twisted steel cross bars welded at 102 mm OC to flat steel bearing bars spaced at 30 mm OC; width and length as indicated on Drawings; galvanized after welding (GAW) finish; eg. Type W/B by Borden Metal Products (Canada) Ltd.
- .3 Wall-Mounted Handrail Bar Brackets: Stainless steel; 75 mm OD mounting plate with three countersunk holes for 6 mm exposed fasteners; 62 mm long radiused plate welded to bent metal bar for mounting bar handrail and complete with two pre-drilled holes; 81 mm offset from wall to center line of handrail bar; No. 5 - Satin finish; eg. Model RB15030.4 by Wagner.
- .4 Vertical Lifeline: Galvanized steel construction; Saf-T-Climb Fall Arrester by North Safety Products.

2.4 ACCESSORIES

- .1 Stainless Steel Bolts: To ASTM F593, Group 1.
- .2 Stainless Steel Nuts and Washers: To ASTM F594, Group 1.
- .3 High-Strength Bolts: To ASTM F3125/F3125M, Type 1 for interior applications, Type 3 for exterior applications; quenched and tempered steel heavy hex structural bolts.
- .4 Medium-Strength Bolts: To ASTM A449, Type 1 for interior applications, Type 3 for exterior applications; quenched and tempered steel hex bolts.
- .5 Machine Bolts: To ASTM A307, Grade A; carbon and alloy steel, galvanized where noted.
- .6 Steel Nuts: To ASTM A563/A563M, Grade A, Heavy Hex Style for use with high strength bolts, and Hex Style for use with medium strength bolts and machine bolts; carbon and alloy steel; galvanized where noted.
- .7 Steel Washers: To ASTM F436/F436M, Type 1 for interior applications, Type 3 for exterior applications; hardened steel washers, circular, bevelled and clipped types as required.
- .8 Aluminum Bolts: To ASTM F468M, shop finished to match adjacent surfaces.
- .9 Aluminum Nuts and Washers: To ASTM F467M, including plain washers; shop finished to match adjacent surfaces.
- .10 Welding Materials: To CSA W59 and CSA W59.2-M.

2.5 PRIMERS

- .1 Primer for Ferrous Metal Surfaces: Red oxide type.
- .2 Primer for Galvanized Surfaces: Zinc-rich paint type.

2.6 FABRICATION

- .1 Prior to fabrication, verify existing conditions and take field measurements to ensure perfect fit of fabricated items.
- .2 Fabricate cold-formed steel components to CSA S136.
- .3 Fabricate metal guards, including balustrades, railings, and handrails to CSA A500.
- .4 Shop weld steel components to CSA W59.
- .5 Shop weld aluminum components to CSA W59.2-M.
- .6 Fit and shop assemble components in largest practical sections to accommodate delivery to Place of the Work.
- .7 Seal joints with continuous welds.

- .8 Grind visually-exposed joints flush and smooth with adjacent finish surface.
- .9 Make visually-exposed joints butt tight, flush and hairline.
- .10 Exposed Mechanical Fastenings: Flush countersunk screws or bolts; except where specifically noted otherwise.
- .11 Supply components required for anchorage of fabrications.

2.7 FINISHES

- .1 Shop Priming:
 - .1 Clean surfaces of rust, scale, grease and foreign matter prior to shop priming.
 - .2 Do not prime surfaces designated to come into direct contact with concrete or where field welding is required.
 - .3 Prime components using minimum two coats primer.
- .2 Galvanizing:
 - .1 Galvanized Coating on Steel Components: To ASTM A123/A123M, Coating Grade 55; hot dipped zinc alloy coating.
 - .2 Galvanized Coating on Steel Hardware: To ASTM A153/A153M, Classes B3, C or D; hot dipped zinc alloy coating.
 - .3 Galvanized Coating on Sheet Steel: To ASTM A653/A653M, Coating Designation Z275; hot dipped zinc alloy coating.
 - .4 Prepare hot dip galvanized coatings to ASTM D6386 for subsequent paint application.
 - .5 Prepare hot dip galvanized coatings to ASTM D7803 for subsequent powder coating application.
- .3 Stainless Steel: To AISI No. 4 - Brushed.
- .4 Anodized Coating on Aluminum: To AAMA 611, AA-M10C21A31, Class II Clear Anodic Oxide coating, No. 17.
- .5 Monochromatic Paint Coating on Aluminum: To AAMA 2605; two-coat thermosetting fluoropolymer PVDF liquid extrusion and coil coating, factory-applied to 0.03 mm dry film thickness; eg. Duranar by PPG Industries, Inc.; colour as selected by Consultant.
- .6 Powder Coated Finish on Metal Components: To AAMA 2604; electrostatically sprayed polymer powder, factory-applied to 0.05 mm dry film thickness; colour as selected by Consultant.
- .7 Monochromatic Paint Coating on Sheet Steel: Two-coat silicone modified polyester coil coating, factory-applied to 0.028 mm dry film thickness; eg. WeatherXL by The Sherwin-Williams Company, colour as selected by Consultant.

3 Execution

3.1 PREPARATION

- .1 Make provision for erection loads with temporary bracing.
- .2 Clean and strip primed steel items to bare metal where field welding is required.
- .3 Supply items required to be cast into concrete and or embedded in masonry with setting templates, to appropriate Sections.

3.2 INSTALLATION

- .1 Install components plumb and level, accurately fitted, free from distortion or defects.
- .2 Provide fasteners and anchors necessary to secure components rigidly in place.

- .3 Field weld steel components to CSA W59.
- .4 Field weld aluminum components to CSA W59.2-M.
- .5 Field bolt and weld to match shop bolting and welding.
- .6 Mechanically fasten joints butted tight, flush and hairline.
- .7 Grind welds smooth and flush.
- .8 After erection, prime welds, abrasions and surfaces not yet shop primed or galvanized, except surfaces designated to come into direct contact with concrete.
- .9 Make Good damaged or defective galvanized coatings to ASTM A780/A780M.

3.3 SCHEDULE

- .1 The following schedule is a list of principal items only. Refer to Drawings for items not specifically scheduled.
 - .1 Sleeves and Openings: Including templates and required information, supplied to appropriate Sections.
 - .2 Attachments: Anchor bolts, washers, nuts, lag screws, expansion shields, toggles, straps, sleeves and brackets; secured with sufficient self-tapping shake-proof screws with flat countersunk heads.
 - .3 Brackets: Fabricated from mild steel plate, sizes and configurations as required to support countertops, shelving, seating, benches, valances, coat hooks and other similar components; pre-drilled for fastening of other components.
 - .4 Lateral Support Brackets for Masonry Partitions: 75 x 75 mm steel angles, 6 mm thick, as follows:
 - .1 Concealed Conditions: 200 mm long and spaced at 3 000 mm OC; minimum two anchors each.
 - .2 Exposed Conditions: Continuous lengths, anchored at 1 000 mm OC.
 - .5 Steel Pipe Bollards: 150 mm OD galvanized steel pipe, sufficient length to be 1 000 mm above finished grade; set in 450 mm OD concrete pier set minimum 1 200 mm deep. Fill steel pipe solid with concrete and finish with rounded top.
 - .6 Metal Balustrades, Guards and Railings: Sizes and configurations as indicated on Drawings; engineered by fabricator to meet specified design criteria; fabricated from shop primed steel for interior applications and galvanized stainless steel for exterior applications.
 - .7 Roof Access Ladder: Conforming to authorities having jurisdiction, mounted 150 mm clear of wall surface; fabricated from galvanized steel and complete with vertical lifeline; as detailed on Drawings.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 05 50 00 - Metal Fabrications.
- .2 Section 09 65 13 - Resilient Base and Accessories.
- .3 Section 09 90 00 - Painting and Coating.

1.2 REFERENCES

- .1 ASTM A563/A563M-21a: Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric).
- .2 ASTM A1008/A1008M-21a: Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.
- .3 ASTM F436/F436M-19: Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
- .4 ASTM F3125/F3125M-23: Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
- .5 CSA A23.1:19: Concrete Materials and Methods of Concrete Construction.
- .6 CSA A500-16: Building Guards.
- .7 CSA G40.20-13 (R2018): General Requirements for Rolled or Welded Structural Quality Steel.
- .8 CSA G40.21-13 (R2018): Structural Quality Steel.
- .9 CSA W47.1:19: Certification of Companies for Fusion Welding of Steel.
- .10 CSA W55.3-08 (R2018): Certification of Companies for Resistance Welding of Steel and Aluminum.
- .11 CSA W59-18: Welded Steel Construction (Metal Arc Welding).

1.3 SHOP DRAWINGS

- .1 Submit Shop Drawings as specified in Section 01 33 00.
- .2 Shop Drawings: Project-specific drawings, illustrating layouts, dimensions, component profiles and sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
- .3 Shop Drawings must be stamped, signed and dated by fabricator's design engineer.

1.4 QUALIFICATIONS

- .1 Fabricator's Design Engineer: A professional structural engineer experienced in designing steel stairs, guards and railings, licensed to practice at Place of the Work.
- .2 Welders: Workers certified by CWB to CSA W47.1 and CSA W55.3.

2 Products

2.1 DESCRIPTION

- .1 Stage Stairs: Steel stair frame of structural sections, with closed risers; steel pan to receive concrete fill stair treads and landings; with integral balustrades and hand railing; shop primed finish.

2.2 DESIGN CRITERIA

- .1 Design stairs to support live load of 4.8 KPa and limit deflection of stringer and landing framing to 1/240 of span.
- .2 Design metal guards, including balustrades, railings and handrails to CSA A500 and applicable regulatory requirements, and capable of resisting:
 - .1 Uniform Load = 0.75 kN/m in any direction.
 - .2 Vertical Load = 1.5 kN/m.
 - .3 Loads on Pickets = 0.5 kN on 100 x 100 mm area.
 - .4 Non-concurrent Loads on Handrails = 0.9 kN applied at any point in any direction.
 - .5 Lateral Force = 1.0 kN at any point without damage or permanent set.

2.3 MATERIALS

- .1 Steel Sections: To CSA G40.20 and CSA G40.21, Grade 300W; sizes and profiles as indicated on Drawings.
- .2 Sheet Steel: To ASTM A1008 /A1008M, Structural Steel (SS) Grade 230, Types 1 and 2; cold-rolled sheet steel; thicknesses as indicated.
- .3 High Strength Bolts: To ASTM F3125/F3125M, Type 1; quenched and tempered steel heavy hex structural bolts.
- .4 Nuts: To ASTM A563/A563M, Grade A, Heavy Hex Style; carbon and alloy steel.
- .5 Washers: To ASTM F436/F436M, Type 1; hardened steel; circular, bevelled and clipped types as required.
- .6 Stair Tread Pans: 2.7 mm thick steel pan; 38 mm deep; smooth surface; square edge.
- .7 Welding Materials: To CSA W59.
- .8 Concrete: To CSA A23.1, Exposure Class N-CF; minimum compressive strength of 20 MPa at 28 days and 50 mm to 75 mm slump at point of placement.
- .9 Shop and Touch-Up Primer: Red oxide type.

2.4 FABRICATION

- .1 Fit and shop assemble components in largest practical sections to accommodate delivery to Place of the Work.
- .2 Fabricate metal guards, including balustrades, railings and handrails, to CSA A500.
- .3 Perform welding to CSA W59.
- .4 Seal joints with continuous welds.
- .5 Grind visually-exposed joints flush and smooth.
- .6 Ease visually-exposed edges to small uniform radius.
- .7 Exposed Mechanical Fastenings: Flush countersunk screws or bolts; except where specifically noted otherwise.

- .8 Supply components required for anchorage of fabrications.
- .9 Fabricate stairs and landings with closed risers and treads of metal pan construction, ready to receive concrete.
- .10 Secure reinforced tread pans to stringers with clip angles; welded in place.
- .11 Form stringers with rolled steel channel sections.
- .12 Weld fascia plates and end plates to stringer channels.
- .13 Form balustrade frames with 40 x 40 mm steel sections, welded to stringers.
- .14 Form pickets with 19 x 19 mm steel sections, welded to balustrades.
- .15 Form handrails with 40 mm OD steel sections, welded to balustrades.

2.5 FINISHES

- .1 Shop Priming:
 - .1 Clean surfaces of rust, scale, grease and foreign matter prior to shop priming.
 - .2 Do not prime surfaces designated to come into direct contact with concrete or where field welding is required.
 - .3 Prime components using minimum two coats primer.

3 Execution

3.1 PREPARATION

- .1 Clean and strip primed steel items to bare metal where site welding is required.
- .2 Supply items required to be cast into concrete or embedded in masonry with setting templates to appropriate Sections.

3.2 INSTALLATION

- .1 Install components plumb and level, accurately fitted, free from distortion or defects.
- .2 Provide anchors, required for connecting stairs to structure.
- .3 Allow for erection loads, and for sufficient temporary bracing until completion of erection and installation of permanent attachments.
- .4 Field weld components to CSA W59.
- .5 Field bolt and weld to match shop bolting and welding.
- .6 Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.
- .7 After erection, prime welds, abrasions, and surfaces not yet shop primed, except surfaces designated to come into direct contact with concrete.
- .8 Install and finish concrete fill to CSA A23.1, Class A.

END OF SECTION

- 1 General
- 1.1 RELATED SECTIONS
 - .1 Section 06 15 33 - Wood.
 - .2 Section 06 20 00 - Finish Carpentry.
 - .3 Section 06 41 00 - Architectural Wood Casework.
 - .4 Section 07 62 00 - Sheet Metal Flashing and Trim.
- 1.2 REFERENCES
 - .1 ASTM A153/A153M-23: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .2 ASTM F593-22: Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
 - .3 ASTM F594-22: Standard Specification for Stainless Steel Nuts.
 - .4 ASTM F1667-21: Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
 - .5 CAN/CSA O80 Series-08 (R2012) Consolidated: Wood Preservation.
 - .6 CAN/CSA-O86-09 Consolidated: Engineering Design in Wood.
 - .7 CSA O112.9-10: Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).
 - .8 CSA O121-08 (R2013): Douglas Fir Plywood.
 - .9 CSA O141-05 (R2009): Softwood Lumber.
 - .10 NLGA Standard Grading Rules for Canadian Lumber, August 2017 Edition.
 - .11 CAN/ULC-S102-2018 (REV1): Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- 1.3 QUALITY ASSURANCE
 - .1 Lumber Identification: Grade stamp clearly identifying assigned grade, mill of origin, moisture content at time of manufacture, species or species group, and grading authority having jurisdiction over mill of origin.
 - .2 Plywood Identification: Face or edge stamp depending on appearance requirement, clearly identifying panel grade, species designation, mill identification, certifying agency and waterproof glue bond designation.
- 1.4 DELIVERY, STORAGE AND HANDLING
 - .1 Refer to Section 01 60 00.
 - .2 Deliver and store Products under waterproof cover.
 - .3 Prevent damage to Products, existing properties and to the Work.
 - .4 Store Products where it does not hinder progress of the Work.
- 1.5 EXISTING CONDITIONS
 - .1 The Work involves renovations and alterations to an existing facility.
 - .2 Include re-blocking or re-framing as required.
 - .3 Make minor adjustments from Drawings wherever existing conditions dictate.

2 Products

2.1 MATERIALS

- .1 Dimension Lumber: To CSA O141, S4S; SPF species kiln dried to S-DRY moisture content; preservative treated for exterior applications, sizes as indicated on Drawings; NLGA Light Framing Grade Category, Standard and Better Common Grade Mix.
- .2 Plywood: To CSA O121, DFP species, SHG Grade, Exterior waterproof glue bond; veneer core, butt edge, unsanded faces; preservative treated for exterior applications, and flame retardant treated where noted, thicknesses as indicated on Drawings.

2.2 ACCESSORIES

- .1 Nails: To ASTM F1667, Type I (NL); common wire type for general use and spiral type for structural connections; sizes necessary to ensure adequate securement; and as follows:
 - .1 For Use with Preservative Treated Wood: Type 304 or 316 stainless steel.
 - .2 For Use with Untreated Wood: Galvanized steel.
- .2 Spikes: To ASTM F1667, Type III (SP); common wire type for general use and spiral type for structural connections; sizes necessary to ensure adequate securement; and as follows:
 - .1 For Use with Preservative Treated Wood: Type 304 or 316 stainless steel.
 - .2 For Use with Untreated Wood: Galvanized steel.
- .3 Staples: To ASTM F1667, Type IV (ST); common wire; leg length necessary to ensure adequate securement; and as follows:
 - .1 For Use with Preservative Treated Wood: Type 304 or 316 stainless steel.
 - .2 For Use with Untreated Wood: Galvanized steel.
- .4 Screws: Bugle head, power driven type, sizes necessary to ensure adequate securement; types as follows:
 - .1 For Use with Preservative Treated Wood: Type 304 or 316 stainless steel.
 - .2 For Use with Untreated Wood: Galvanized steel.
- .5 Stainless Steel Bolts: To ASTM F593, Group 1.
- .6 Stainless Steel Nuts: To ASTM F594, Group 1.
- .7 Adhesive: To CSA O112.9.
- .8 Anchors: Toggle bolt type for anchorage to hollow masonry, expansion shield and lag bolt type for anchorage to solid masonry or concrete, or bolts or ballistic fasteners for anchorages to steel.
- .9 Touch-Up Wood Preservative: To CAN/CSA O80; brush-applied copper azole (CBA-A or CA-B) or alkaline copper quaternary (ACQ) preservative.
- .10 Touch-up Flame Retardant Coating: To CAN/CSA O80; brush-applied Dricon by Lonza.

2.3 FINISHES

- .1 Flame Retardant Treatment
 - .1 Flame Retardant Treatment: To CAN/CSA O80; chemically treated and pressure impregnated; as follows:
 - .1 Surface Burning Characteristics (CAN/ULC-S102): Flame spread index ≤ 25 .
 - .2 Manufacturer and Product Name: eg. Dricon by Lonza.
 - .2 Flame retardant treated materials must bear a ULC classification label.

- .2 Wood Preservative Treatment:
 - .1 Wood Preservative Treatment: To CAN/CSA O80; chemically treated and pressure impregnated using copper azole (CBA-A or CA-B) or alkaline copper quaternary (ACQ) preservative.
 - .2 Preservative treated materials must bear CSA classification label.
 - .3 Make preservative treated materials available for inspection by Consultant at place of treatment, before shipment to Place of the Work.
 - .3 Galvanized Coating on Steel Fasteners: To ASTM A153/A153M, Classes C or D; hot dipped zinc alloy coating.
- 3 Execution
- 3.1 SITE APPLIED WOOD TREATMENT
- .1 When wood in contact with exterior cementitious materials, roofing and related metal flashings has not been previously preservative treated, brush apply two coats of touch-up wood preservative.
 - .2 Apply two coats of touch-up wood preservative to sawn ends of preservative treated material.
 - .3 Apply two coats of touch-up flame retardant coating to sawn ends of flame retardant treated material.
 - .4 Apply touch up coatings to CSA O80.
- 3.2 INSTALLATION
- .1 Erect wood framing members level and plumb.
 - .2 Place horizontal members laid flat, crown side up.
 - .3 Construct framing members full length without splices.
 - .4 Secure plywood sheets perpendicular to framing members with ends staggered, and sheet edges secured directly over firm bearing.
 - .5 Provide wood blocking required for attachment of fitments and equipment by other Sections.
 - .6 Provide 19 mm thick flame retardant treated plywood backer board on wood blocking for mounting electrical equipment where indicated on Drawings.
 - .7 Construct curb and cant members of single pieces per location.
 - .8 Curb roof openings except where prefabricated curbs are provided.
 - .9 Form corners by lapping side members alternately.
 - .10 Coordinate work with installation of decking and support of decking at openings.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Wood Framing (Shade Structures)
- .2 Preservative treatment of wood.

1.2 RELATED SECTIONS

- .1 06 10 63 - Rough Carpentry

1.3 DEFINITIONS

- .1 Delegated Design Professional: The specialist or supporting design professional contracted to the contractor, fabricator or manufacturer to design and/or review specific building components or sub-components, and provide Shop Drawings and Delegated Design Submittals to meet the requirements of authorities having jurisdiction.

1.4 REFERENCES

- .1 CSA-O86-14 - Engineering Design in Wood.
- .2 CAN/CSA-O80 Series-08 (R2012) - Wood Preservation.
 - .1 [CSA-O80.1-15 - Specification for Treated Wood.
 - .2 [CSA-O80.3-15 - Preservative Formulations.
- .3 CSA-O141-05 (R2014) - Softwood Lumber.
- .4 NLGA (National Lumber Grades Authority) - Standard Grading Rules for Canadian Lumber, 2014 Edition.

1.5 SUBMITTALS FOR REVIEW

- .1 Product Data: Provide technical data on wood preservative materials for end cuts

1.6 QUALITY ASSURANCE

- .1 Perform Work in accordance with the following agencies:
 - .1 Lumber Grading Agency: Certified by [NLGA].
- .2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.
- .3 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience.

- .4 Pressure Preservative Treated Wood: Marked with certification mark authorized by the Canadian Wood Preservers Bureau (CWPB) indicating producer, preservative type, retention and Use Category

Part 2 Products

2.1 MANUFACTURERS

- .1 MicroPro Sienna Pressure Treated Lumber or approved alternate

2.2 MATERIALS

- .1 Dimension Lumber: [CSA-O141], softwood lumber unless indicated otherwise, maximum moisture content 15% graded to Standard Grading Rules for Lumber.
 - .1 Lumber Framing: species: Spruce-Pine-Fir Pressure Treated, size as per drawings.

2.3 ACCESSORIES

- .1 Fasteners and Anchors:
 - .1 Galvanized Coating for Exterior Work: Hot dip galvanized to ASTM A153/A153M.
 - .2 Galvanized Coating for Treated Wood: Hot dip galvanized to ASTM A153/A153M
 - .3 All fasteners to be compatible with Pressure Treated lumber

Part 3 Execution

3.1 EXAMINATION

- .1 Verify that sub structure (piers, posts, beams) are appropriately placed and secured to receive next members as indicated by standard and accepted building practices.

3.2 PREPARATION

- .1 Coordinate placement of support items.

3.3 SITE APPLIED WOOD TREATMENT FOR FRAMING

- .1 Apply preservative treatment to manufacturer's written instructions.
- .2 Brush apply two (2) coats on wood requiring cutting or drilling after treatment
- .3 Allow preservative to dry prior to erecting members.

3.4 FRAMING

- .1 Set structural members level and plumb, in correct position.

- .2 Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation
- .3 Place horizontal members, crown side up.
- .4 Construct load bearing framing members full length without splices.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 06 10 00 - Rough Carpentry.
- .2 Section 06 24 00 - High Pressure Decorative Laminate.
- .3 Section 06 41 00 - Architectural Wood Casework.
- .4 Section 07 92 00 - Joint Sealants.
- .5 Section 08 71 00 - Door Hardware.
- .6 Section 09 90 00 - Painting and Coating.

1.2 REFERENCES

- .1 ANSI A208.1-2009: Particleboard.
- .2 ANSI A208.2-2009: Medium Density Fiberboard (MDF) for Interior Applications.
- .3 ASTM B456-17(2022): Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- .4 ASTM F1667-21: Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- .5 AWMAC NAAWS 4.0-2021: North American Architectural Woodwork Standards.
- .6 CSA O141-05 (R2009): Softwood Lumber.
- .7 CSA O151-09: Canadian Softwood Plywood.
- .8 ANSI/HPVA HP-1-2020: American National Standard for Hardwood and Decorative Plywood.
- .9 NFPA 260-2019: Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture.
- .10 NHLA Grading Rules.
- .11 CAN/ULC-S109-14 (R2019): Standard Method for Flame Tests of Flame-Resistant Fabrics and Films.

1.3 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Selection Samples: Duplicate 300 x 300 mm size upholstery fabric samples, illustrating fabric texture, weight, weave, and available colours and patterns.
- .3 Verification Samples: Duplicate samples, as follows:
 - .1 Hardwood Plywood: 300 x 300 mm size, illustrating full thickness of sheet, number of plies, edge and joint trim, and quality of wood grain.
 - .2 Hardwood Trim: 300 mm long, illustrating size and shape of profiles, and quality of wood grain.

1.4 QUALIFICATIONS

- .1 Trim and Finish Carpenter: A firm employing workers specializing in finish carpentry work, having minimum 3 years documented experience.

2 Products

2.1 PERFORMANCE CRITERIA

- .1 Fire Classification of Upholstery Fabrics: Flame-retardant and fire-resistant to NFPA 260, Class 1 and CAN/ULC-S109.
- .2 Flammability of Foam Padding: Passing Motor Vehicle Safety Standard 302 and California Technical Bulletin 117A.

2.2 LUMBER

- .1 Dressed Softwood Lumber (DL-SWD): To CSA O141; SPF species, kiln dried to maximum 7 percent moisture content, with mixed grain capable of receiving high quality opaque finish; sizes as indicated on Drawings.
- .2 Dressed Hardwood Lumber (DL-HWD): Maple species, to NHLA Select and Better Grade; kiln dried to maximum 7 percent moisture content, with vertical grain capable of receiving high quality transparent finish; sizes as indicated on Drawings.
- .3 Dimension Lumber: As specified in Section 06 10 00.

2.3 PLYWOOD

- .1 Softwood Plywood (PLY-SWD): To CSA O151; CSP species, SEL TF Grade; SPF veneer core of minimum 9 plies; thicknesses as indicated on Drawings; capable of receiving high quality opaque finish.
- .2 Hardwood Plywood (PLY-HWD): To ANSI/HPVA HP-1, Architectural G1S, thicknesses as indicated on Drawings; as follows:
 - .1 Core: Hardwood veneer core, minimum 9 plies.
 - .2 Face Veneers: Maple species; Face Grade A; Plain-Sliced; of clear Pleasing match grain capable of receiving high quality transparent finish.

2.4 COMPOSITE BOARDS

- .1 Particleboard (PB): To ANSI A208.1, Grade M-2; made from 100 percent post-industrial wood fibres; minimum 635 kg/m³ density and maximum 6 percent moisture content; no added urea formaldehyde (nauf); certified EPP by Composite Panel Association; thicknesses as indicated on Drawings.
- .2 Medium Density Fiberboard (MDF): To ANSI A208.2, Grade MD; minimum 740 kg/m³ density and moisture content between 4.5 - 8.0 percent; thicknesses as indicated on Drawings.

2.5 ACCESSORIES

- .1 Metal Tube Closet Rod System: 27 mm OD, heavy wall steel tube rod, with heavy duty metal flanges and brackets; chrome-plated finish.
- .2 Decorative Laminate: High pressure decorative laminate, Type HPDL as specified in Section 06 24 00.
- .3 Contact Adhesives: Water base type.
- .4 Wall Adhesive: Solvent release, cartridge type, compatible with wall substrate, capable of achieving durable bond.
- .5 Nails: To ASTM F1667, Type I (NL), galvanized steel, common wire; sizes necessary to ensure adequate securement.
- .6 Staples: To ASTM F1667, Type IV (ST); galvanized steel, common wire; leg length necessary to ensure adequate securement.

- .7 Screws: Galvanized steel, tapered head suitable for counter sunk applications; sizes necessary to ensure adequate securement.
- .8 Bolts, Nuts, Washers, Lags and Blind Fasteners: Size and type to suit application; plain finish.
- .9 Primer: Alkyd primer sealer type.
- .10 Wood Filler: Solvent base, tinted to match surface finish colour.
- .11 Joint Sealant: Interior general purpose sealant, Type SEAL-INT-GP as specified in Section 07 92 00.
- .12 Foam Padding: Polyurethane foam, CFC free, Gold colour, complete with factory-adhered Dacron wrap; and as follows:
 - .1 Foam Thickness: 76 mm.
 - .2 Density: $\geq 38.4 \text{ kg/m}^3$.
 - .3 Indentation Force Deflection: $\geq 210 \text{ N}$.
 - .4 Resilience: ≥ 55 percent.
 - .5 Compression Set: ≤ 10 percent permanent height loss after 90 percent compression for 22 hours @ 70 degrees C.
 - .6 Product and Manufacturer Name: eg. Ultracel 2550 by DomFoam International Inc.
- .13 Upholstery Fabric: 745 g/m² polyester-reinforced vinyl fabric; colour and pattern as selected by Consultant.

2.6 FABRICATION - UPHOLSTERED SEATING

- .1 Laminate foam components with Dacron wrap using VOC-free adhesive.
- .2 Reinforce upholstery seams with suitable commercial quality thread of fiber compatible with upholstery fabric and cushion components.
- .3 Fabricate upholstery fabric with zippered fasteners to facilitate easy removal for cleaning.
- .4 Fabricate cushion faces free of seams.
- .5 Fabricate cushions with suitable air release vents placed in inconspicuous position.
- .6 Stretch upholstery fabric firm and smooth over foam padding, with no sagging or puckering.
- .7 Provide velcro fasteners for attachment of upholstered seating to supporting substrate.

2.7 FINISHES

- .1 Chrome/Nickel Plating on Metal Components: To ASTM B456, Type SC 2; electrodeposited nickel plus chromium coating; Polished.

3 Execution

3.1 INSTALLATION

- .1 Install Products to AWMAC NAAWS 4.0, Custom Grade.
- .2 Set and secure Products in place; straight, plumb and level.
- .3 Unless noted otherwise, install Products with nails, screws, or bolts with blind fasteners spaced at 400 mm OC, or adhesive as required by specific installation requirements.
- .4 Finish exposed edges of veneer-clad panels with 3.2 mm thick hardwood edge trim, glued and nailed.

- .5 Finish exposed edges of laminate-clad panels with 1.0 mm thick decorative laminate edgebanding, applied using hot melt adhesive.
- .6 Install upholstered seating using removable velcro fasteners.
- .7 Apply decorative laminate to core materials as specified in Section 06 24 00.
- .8 Install metal tube closet rod system where indicated on Drawings.
- .9 Install door hardware as specified in Section 08 71 00.
- .10 Seal gaps and joints as specified in Section 07 92 00.

3.2 ADJUSTING AND CLEANING

- .1 Set exposed fasteners.
- .2 Apply wood filler over exposed nail and staple indentations. Allow to dry and sand smooth.
- .3 Conceal countersunk fasteners with matching hardwood dowels, sanded smooth and flush to adjacent surface.
- .4 Clean and prepare surfaces for site finishing. Coordinate with Section 09 90 00.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 06 20 00 - Finish Carpentry.
- .2 Section 06 41 00 - Architectural Wood Casework.

1.2 REFERENCES

- .1 AWMAC NAAWS 4.0-2021: North American Architectural Woodwork Standards.
- .2 CAN/CGSB-71.20-M88: Adhesive, Contact, Brushable.
- .3 ANSI/NEMA LD 3-2005: High Pressure Decorative Laminates.

1.3 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Selection Samples: Duplicate chains of laminate samples, illustrating available colours, patterns and textures.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver decorative laminate with heavy kraft paper protection and in cartons during shipping.
- .3 Store Products protected from damage.
- .4 Do not store or install Products in areas where relative humidity is less than 25 percent RH or greater than 60 percent RH at 22 degrees C.

1.5 WARRANTY

- .1 Submit extended warranty in accordance with General Conditions of the Contract.
- .2 Extended Warranty: For a period of two years, covering against warping, splitting or delamination, subject to normal usage excluding excessive moisture or heat.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 Arborite.
 - .2 Formica.
 - .3 Nevamar.
 - .4 Octolam.
 - .5 Pionite.
 - .6 Tafisa.
 - .7 Wilsonart.
- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 MATERIALS

- .1 High Pressure Decorative Laminate (HPDL): To ANSI/NEMA LD 3; decorative surface papers impregnated with melamine resins, bonded under heat and pressure to kraft papers impregnated with phenolic resins; colours, textures and patterns as selected by Consultant; NEMA Types, Grades and thicknesses as listed below:
 - .1 General Purpose Type: Grade HGS; 1.2 mm thick.
 - .2 Vertical Surface Type: Grade VGS; 0.7 mm thick.
 - .3 Postforming Type: Grade HGP; 1.0 mm thick.
 - .4 Vertical Postforming Type: Grade VGP; 0.7 mm thick.
 - .5 Cabinet Liner Type: Grade CLS; 0.5 mm thick.
 - .6 Backer Type: Grade BKM; 1.0 mm thick.
- .2 Core Materials: As indicated on Drawings.
- .3 Sealer: Water-resistant type.
- .4 Draw Bolts and Splines: Suitable for new core bases, and acceptable to fabricator.
- .5 Contact Adhesive: To CAN/CGSB-71.20-M.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Verify cutouts in core materials are prepared for faucets, sinks and other penetrating components.

3.2 PREPARATION

- .1 Make joints in core materials tight, flush and hairline. Use draw bolts and splines.
- .2 Round internal corners, chamfer edges and seal exposed edges in core materials.

3.3 INSTALLATION

- .1 Comply with ANSI/NEMA LD 3, Annex A and AWMAC NAAWS 4.0.
- .2 Install Products plumb, true and square, neatly scribed and fitted to adjoining surfaces.
- .3 Ensure adjacent laminate sheets match in colour, texture and pattern.
- .4 Ensure decorative laminate and core profiles coincide to ensure full continuous support and bond over entire surface.
- .5 Use continuous lengths to minimize joints.
- .6 Locate joints no closer than 600 mm from cutouts.
- .7 Offset joints in decorative laminate from joints in core material.
- .8 Apply decorative laminate to exposed edges of core material for straight self-edging strips or flat work.
- .9 Chamfer exposed edges of decorative laminate uniformly at 20 degrees.
- .10 Do not mitre decorative laminate edges.
- .11 Apply backing sheets where required to conceal and balance core material.

.12 Apply cabinet liner sheets to interior of cabinets where indicated on Drawings.

3.4 FIELD QUALITY CONTROL

.1 Gaps at corners, or gaps between laminate and core materials will be rejected by Consultant.

3.5 CLEANING

.1 Refer to Section 01 74 00.

.2 Remove kraft paper protective covering.

.3 Visually inspect each installed item, wash and thoroughly polish surfaces.

3.6 PROTECTION

.1 Refer to Section 01 76 00.

.2 Protect completed installation from damage with removable, temporary protective coverings.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 06 10 00 - Rough Carpentry.
- .2 Section 06 20 00 - Finish Carpentry.
- .3 Section 06 24 00 - High Pressure Decorative Laminate.
- .4 Section 07 92 00 - Joint Sealants.
- .5 Section 09 65 13 - Resilient Base and Accessories.

1.2 REFERENCES

- .1 ANSI A135.4-2004: Basic Hardboard.
- .2 ANSI A208.1-2009: Particleboard.
- .3 ASTM A240/A240M-22b: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .4 ASTM A276/A276M-17: Standard Specification for Stainless Steel Bars and Shapes.
- .5 ASTM B456-17(2022): Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- .6 ASTM F1667-21: Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- .7 AWMAC NAAWS 4.0-2021: North American Architectural Woodwork Standards.
- .8 ANSI/BHMA A156.9-2015: Cabinet Hardware.
- .9 ANSI/BHMA A156.11-2014: Cabinet Locks.
- .10 CSA O112.9-10: Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).
- .11 CSA O112.10-08 (R2013): Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
- .12 CSA O141-05 (R2009): Softwood Lumber.
- .13 CSA O151-09: Canadian Softwood Plywood.
- .14 ANSI/HPVA HP-1-2020: American National Standard for Hardwood and Decorative Plywood.
- .15 NHLA Grading Rules.

1.3 SHOP DRAWINGS

- .1 Submit Shop Drawings as specified in Section 01 33 00.
- .2 Shop Drawings: Project-specific drawings, illustrating layouts, dimensions, materials, component profiles and sizes, jointing details, factory-applied finishes, accessories, locations of outlets, methods of attachment and hardware.

1.4 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Verification Samples: Duplicate samples, as follows:
 - .1 Melamine Composite Panel: 300 x 300 mm size, illustrating laminate-clad face colour, pattern and texture; core materials; and quality of PVC edgebanding.

- .2 Hardwood Panel: 300 x 300 mm size, illustrating quality of veneer faces, edge profile, quantity of plies, joint and edge trim and shop-applied finish.
- .3 Hardwood Trim: 300 mm long, illustrating profile sizes and shapes, quality of wood grain and shop-applied finish.

1.5 QUALIFICATIONS

- .1 Fabricator and Installer: A firm specializing in fabricating and installing custom casework, having minimum 3 years documented experience and a member of AWMAC.

1.6 MOCK-UPS

- .1 Construct mock-ups as specified in Section 01 40 00.
- .2 Mock-up: Full-size, 450 mm wide sample of each type of custom wood casework, including materials, finishes, hardware and countertops.
- .3 Accepted mock-ups will be used as the standard for acceptance of the Work.
- .4 Remove and replace installed Product that does not conform to accepted mock-up.
- .5 Remove mock-ups from Place of the Work upon Ready-for-Takeover.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Store Products under waterproof cover both in transit and at Place of the Work in a manner to prevent damage to Products, to existing property and to the Work.
- .3 Store completed Products in a dry, clean area where it does not hinder progress of the Work.
- .4 Do not store or install Products in the Work until building is dry and heated.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of factory-made library furniture having Product considered acceptable for use:
 - .1 Brodart.
 - .2 Carr McLean.
 - .3 Palmieri.
 - .4 School House Products.
- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 MATERIALS

- .1 Dressed Lumber - Hardwood (DL-HWD): Maple species; NHLA Select and Better Grade; kiln dried to maximum 7 percent moisture content, with vertical grain capable of receiving high quality transparent finish; sizes as indicated on Drawings.
- .2 Plywood - Hardwood (PLY-HWD): To ANSI/HPVA HP-1, Architectural G2S, thicknesses as indicated on Drawings; as follows:
 - .1 Core: Composite core, moisture-resistant particle board to ANSI A208.1, Grade M-3 - Exterior Glue.
 - .2 Face Veneers: Maple species; Face Grade A; Plain-Sliced; of clear Pleasing match grain capable of receiving high quality transparent finish.

- .3 Melamine Composite Panel (MCP): Particleboard core with factory-applied low pressure laminate thermo-fused to both faces; Premium quality; colours, textures and patterns as selected by Consultant; thicknesses as indicated on Drawings.
- .4 Particleboard (PB): To ANSI A208.1, Grade M-2; made from 100 percent post-industrial wood fibres; minimum 635 kg/m³ density and maximum 6 percent moisture content; no added urea formaldehyde (nauf); certified EPP by Composite Panel Association; thicknesses as indicated on Drawings.
- .5 Hardboard (HB): To ANSI A135.4, Class 1 - Tempered; inter-felted ligno-cellulosic fibers consolidated under heat and pressure; minimum 500 kg/m³ density; S1S surface finish; complete with factory-applied low pressure laminate thermo-fused to one face; colours, textures and patterns as selected by Consultant; thicknesses as indicated on Drawings.
- .6 Dimension Lumber: As specified in Section 06 10 00; sizes as indicated on Drawings.

2.3 MANUFACTURED UNITS

- .1 Factory-made Library Furniture: As indicated on Drawings.

2.4 ACCESSORIES

- .1 Adhesive for Wet Area Exposures: To CSA O112.9.
- .2 Adhesive for Dry Area Exposures: To CSA O112.10.
- .3 Nails: To ASTM F1667, Type I (NL); galvanized steel, common wire; sizes necessary to ensure adequate securement.
- .4 Spikes: To ASTM F1667, Type III (SP); galvanized steel, common wire; sizes necessary to ensure adequate securement.
- .5 Staples: To ASTM F1667, Type IV (ST); galvanized steel, common wire; leg length necessary to ensure adequate securement.
- .6 Screws: Galvanized steel, bugle head, power driven type, sizes necessary to ensure adequate securement.
- .7 Stainless Steel Sheet and Plate: To ASTM A240/A240M, Type 304; sizes and thicknesses as indicated on Drawings.
- .8 Stainless Steel Bar and Shape: To ASTM A276/A276M, Type 304; sizes and profiles as indicated on Drawings.
- .9 Decorative Laminate: High pressure decorative laminate, Type HPDL as specified in Section 06 24 00.
- .10 Solid Plastic Edgebanding: 3 mm thick PVC edgebanding with eased edge, colour and pattern to match cabinet panel faces, unless noted otherwise.
- .11 Kickplate Base: Resilient base, RB-2 as specified in Section 09 65 13.
- .12 Joint Sealants: As specified in Section 07 92 00, types as follows:
 - .1 Dry Areas and Food Preparation Wet Areas: Interior general purpose sealant, SEAL-INT-GP.
 - .2 Other Wet Areas: Interior mildew-resistant sealant, SEAL-INT-MR.

2.5 CASEWORK HARDWARE

- .1 Unless specified otherwise, Provide cabinet hardware to ANSI/BHMA A156.9, Grade 1.

- .2 Casework Hinges: Fully-concealed, adjustable, articulated, screw on type metal hinges; accommodating 100 degree, 110 degree, 125 degree, and 170 degree openings, and complete with soft-closing mechanism.
- .3 Door Pulls: Stainless steel, 10 mm OD handle, 185 mm overall length with 128 mm centre-to-centre fastening and 35 mm projection; eg. Contemporary Stainless Steel Handle Pull - 2102 by Richelieu.
- .4 Locks: To ANSI/BHMA A156.11, Operational Class, Grade 1; complete with spring actuated elbow catches and strike plates for locks occurring in hinged double door units; Chrome finish; keyed to Owner's master keying system.
- .5 Elbow Catch: Ives 2-MB, C15 finish.
- .6 Door Bumper: Nylon, eg. Model MP303-11 by Richelieu.
- .7 Pilaster Strip: 16 mm wide, 4 mm deep perforated metal strip, zinc plated; length as required; Model 2332GXX by Richelieu.
- .8 Pilaster Clip: Heavy duty bent metal clips, zinc plated; Model CP2562G by Richelieu.
- .9 Shelf Support for Drilled Gable: 5 mm OD metal pin, plastic-clad; eg. Model 34004011 by Richelieu.
- .10 Support Housing and Bolt: Nickel-plated metal, 9.5 mm mounting centre, suitable for 19 mm thick panels; complete with matching connecting bolt; eg. Rafix-SE Housing Model 263.15.705 by Hafele.
- .11 Magnetic Catch: Magnetic catch, automatic opening.
- .12 Base Cabinet Leveller: 100 mm size, adjustable to minus 5 mm and plus 10 mm; Model 637.45.326 by Hafele.

2.6 FABRICATION

- .1 Prior to fabrication, verify existing conditions and take field measurements necessary to ensure a perfect fit.
- .2 Fabricate Products to AWMAC NAAWS 4.0, Custom Grade.
- .3 Manufacture casework as individual cabinets in standard width increments, or in custom widths where indicated on Drawings.
- .4 Fabricate each module to be self-supporting with both exterior gables finished to allow removal and relocation without alterations to casework.
- .5 Pre-drill and cut mounting holes for sinks, faucets and electrical receptacles.
- .6 Finish exposed edges of veneer-faced components with 3.2 mm thick hardwood edgebanding, glued and nailed.
- .7 Finish exposed edges of laminate-faced components with solid plastic edgebanding, applied with an edge-bander using hot melt adhesive.
- .8 Secure wall case and floor case bottoms to casework with three locking mechanical fasteners at each end.
- .9 Secure fixed shelves, toe space rails, bottom rails, and top rails to casework with two locking mechanical fasteners at each end.
- .10 Limit unsupported span of shelving to AWMAC NAAWS 4.0.

- .11 Rabbet gables and insert pilaster strips for flush, recessed appearance. Screw fasten pilaster strips in place.
- .12 Construct joints to have a good fit, fully glued and rigid in final construction.
- .13 Hardware Preparation: Factory install cabinet hinges, runners and hardware, anchored firmly into position for long life under hard use; in the following quantities:
 - .1 Doors up to 1 000 mm High: Two.
 - .2 Doors up to 1 500 mm High: Three.
 - .3 Doors greater than 1 500 mm High: Four.
- .14 Equally space banks of drawers, minimum 120 mm high.
- .15 Apply decorative laminate to core materials as specified in Section 06 24 00.
- .16 Factory seal cutouts and service fitting openings in countertops with moisture-resistant epoxy.
- .17 Drill holes in gables to receive adjustable shelving pins. Provide ferrow sleeves in drilled holes.
- .18 Install neoprene or rubber bumpers at top and bottom of doors and drawers.
- .19 Adjust doors and drawers to proper operation prior to installation.

2.7 FINISHES

- .1 Transparent Finish on Hardwood and Hardwood Veneer-clad Products: To AWMAC NAAWS 4.0, System 12 - POLYURETHANE, WATER-BASED, Custom Grade for Transparent finish; colour and sheen as selected by Consultant.
- .2 Chrome/Nickel Plating on Metal Components: To ASTM B456, Type SC 2; electrodeposited nickel plus chromium coating; Polished.
- .3 Stainless Steel: To AISI No. 4 - Brushed.

3 Execution

3.1 INSTALLATION

- .1 Install Products to AWMAC NAAWS 4.0, Custom Grade.
- .2 Where practical, assemble finished casework at mill and deliver to Place of the Work ready for installation.
- .3 Accurately fit joints and miters and set nail heads ready for finishing.
- .4 Set and secure materials and components in place, rigid, square and plumb.
- .5 Provide wood blocking, framing or furring shown on Drawings as part of casework fabrication or erection.
- .6 Accurately scribe and closely fit compounds to irregularities of adjacent surfaces.
- .7 Use draw bolts and splines to form tight, flush, hairline joints. Accurately fit joints in true plane, locate joints over bearing or supporting surfaces.
- .8 Provide heavy duty fasteners, securely anchoring casework to floor, ceiling and wall surfaces. Use only concealed type fasteners.
- .9 Where permitted, secure concealed elements with small headed finishing nails. Countersink nail heads with nail setter.

- .10 Provide sinks, service fittings and electrical outlets. Coordinate with other Sections for connection to facility services.
 - .11 Where access is required to valves and other facility service components located behind casework, Provide removable wood access panels, each secured with minimum four brass screws.
 - .12 Install laminate-clad countertops, as specified in Section 06 24 00.
 - .13 Provide closers and filler strips in matching finish as required to ensure a neat and complete finished assembly.
 - .14 Install kickplate base as specified in Section 09 65 13.
 - .15 Install factory-made library furniture as indicated on Drawings.
 - .16 Seal gaps and joints in wet areas with mildew-resistant joint sealer, and in non-wet areas with general purpose interior sealant. Conform to Section 07 92 00.
- 3.2 ADJUSTING
- .1 Adjust doors and drawers to proper operation after installation.
 - .2 Fill and touch up damaged finishes to match factory finish.
 - .3 Replace damaged Product that can not be repaired.
- 3.3 PROTECTION
- .1 Refer to Section 01 76 00.
 - .2 Protect completed installation from damage with protective coverings.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 22 00 - Concrete Unit Masonry.
- .2 Section 07 21 19.13 - Foamed-in-Place Urethane Insulation.
- .3 Section 07 26 00 - Vapour Retarders.
- .4 Section 07 27 00 - Air Barriers.
- .5 Section 07 42 43 - Composite Wall Panels.
- .6 Section 07 52 00 - Modified Bituminous Membrane Roofing.
- .7 Section 07 84 00 - Firestopping.
- .8 Section 09 21 16 - Gypsum Board Assemblies.
- .9 Section 31 23 10 - Excavation, Trenching, Backfilling.
- .10 Section 32 11 23 - Aggregate Base Courses.

1.2 REFERENCES

- .1 ASTM C518-21: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- .2 ASTM C612-14(2019): Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- .3 ASTM C1104/C1104M-19: Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
- .4 ASTM D1621-10: Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- .5 ASTM D2842-19: Standard Test Method for Water Absorption of Rigid Cellular Plastics.
- .6 ASTM E96/E96M-23: Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
- .7 CGSB 71-GP-24M: Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation.
- .8 CAN/ULC-S102-2018 (REV1): Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .9 CAN/ULC-S107-2019: Standard Methods of Fire Tests of Roof Coverings.
- .10 CAN/ULC-S114-2018: Standard Method of Test for Determination of Non-Combustibility in Building Materials.
- .11 CAN/ULC-S126-14 (R2019): Standard Method of Test for Fire Spread Under Roof-Deck Assemblies.
- .12 CAN/ULC-S701.1-2017: Standard for Thermal Insulation, Polystyrene Boards.
- .13 CAN/ULC-S702.1:2021: Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification.
- .14 ULC-S702.2-15: Standard for Mineral Fibre Thermal Insulation for Buildings, Part 2: Installation.

- .15 CAN/ULC-S704.1-2017: Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.
- .16 CAN/ULC-S770-15 (R2020): Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Store, handle and protect Products as specified in Section 01 60 00.
- .2 Minimize time plastic-type insulation Products are stored or exposed to sunlight at Place of the Work.
- .3 Store Products away from construction activity and sources of ignition.
- .4 Protect Products from damage during handling, installation and at point of installation.

1.4 AMBIENT CONDITIONS

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

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of extruded polystyrene rigid board insulation having Product considered acceptable for use:
 - .1 DuPont de Nemours, Inc.
 - .2 Owens-Corning Canada Inc.
- .2 Manufacturers of polyisocyanurate rigid board insulation having Product considered acceptable for use:
 - .1 Atlas Roofing Corporation.
 - .2 Elevate.
 - .3 GAF Materials Corporation.
 - .4 Hunter Panels.
 - .5 IKO Industries Ltd.
 - .6 Soprema.
- .3 Manufacturers of mineral fibre batt and blanket insulation having Product considered acceptable for use:
 - .1 CertainTeed Canada, Inc.
 - .2 Knauf Insulation.
 - .3 Owens-Corning Canada Inc.
 - .4 Rockwool.
- .4 Substitution Procedures: Refer to Section 01 25 00.

2.2 REGULATORY REQUIREMENTS

- .1 Conform to applicable regulatory requirements for combustibility and surface burning characteristic requirements of polystyrene insulations.
- .2 Ensure foamed plastic insulations contain zero HFC and HCFC blowing agents, and conform to Global Warming Potential (GWP) values required by The Montreal Protocol.

2.3 RIGID BOARD INSULATION

- .1 Rigid Board Insulation (INS-RB-1): To CAN/ULC-S701.1, Type 4; extruded polystyrene (XPS) rigid board insulation, closed cell type, with integral high density skin; and as follows:
 - .1 Aged Thermal Resistance (ASTM C518): $RSI \geq 0.88$ per 25 mm of thickness.
 - .2 Board Size: 600 x 2 400 mm.
 - .3 Compressive Strength (ASTM D1621): 210 KPa.
 - .4 Water Absorption (ASTM D2842): ≤ 0.7 percent by volume.
 - .5 Edges: Shiplap.
 - .6 Water Vapour Permeance (ASTM E96/E96M): 50 ng/Pa•s•m².
 - .7 Thickness: As indicated on Drawings.
 - .8 Manufacturer and Product Name: eg. Styrofoam SM by DuPont de Nemours, Inc.
- .2 Rigid Board Insulation (INS-RB-2): To CAN/ULC-S701.1, Type 2; extruded polystyrene (XPS) rigid board insulation, closed cell type, with integral high density skin; and as follows:
 - .1 Aged Thermal Resistance (ASTM C518): $RSI \geq 0.88$ per 25 mm of thickness.
 - .2 Compressive Strength (ASTM D1621): 110 KPa.
 - .3 Water Absorption (ASTM D2842): ≤ 0.9 percent by volume.
 - .4 Edges: Shiplap.
 - .5 Water Vapour Permeance (ASTM E96/E96M): 201 ng/Pa•s•m².
 - .6 Thickness: As indicated on Drawings.
 - .7 Manufacturer and Product Name: eg. Styrofoam Cladmate by DuPont de Nemours, Inc.
- .3 Rigid Board Insulation (INS-RB-3): To CAN/ULC-S704.1; polyisocyanurate rigid board insulation, closed cell type; and as follows:
 - .1 Long Term Thermal Resistance (CAN/ULC-S770): $RSI \geq 0.93$ per 25 mm of thickness.
 - .2 Compressive Strength (ASTM D1621): 140 kPa.
 - .3 Faces: Glass reinforced mat facers both sides.
 - .4 Water Absorption (ASTM D2842): < 1 percent.
 - .5 Edges: Square.
 - .6 Combustibility: Meets CAN/ULC-S107 and CAN/ULC-S126.
 - .7 Water Vapour Permeance (ASTM E96/E96M): 85 ng/Pa•s•m².
 - .8 Thickness: Do not use boards less than 38 mm thick; total thickness as indicated on Drawings using a minimum of two layers.
 - .9 Manufacturer and Product Name: eg. ISO 95+GL by Elevate.

2.4 BATT AND BLANKET INSULATION

- .1 Batt Insulation (INS-BB-1): To CAN/ULC-S702.1, Type 1; mineral fibre non-rigid, friction fit thermal batt insulation, manufactured from glass, rock, or slag fibers; and as follows:
 - .1 Aged Thermal Resistance (ASTM C518): $RSI \geq 0.75$ per 25 mm of thickness.
 - .2 Facing: Unfaced.
 - .3 Batt Size: 413 x 1 219 mm.
 - .4 Density (ASTM C612): 32 kg/m³.
 - .5 Combustibility (CAN/ULC-S114): Noncombustible.
 - .6 Thickness: As indicated on Drawings.
 - .7 Manufacturer and Product Name: eg. ComfortBatt by Rockwool.

2.5 ACCESSORIES

- .1 Mechanical Fasteners: Stainless steel screw type fastener, complete with 75 mm OD moulded plastic disc washer.
- .2 Adhesive for Use with Polystyrene: To CGSB 71-GP-24M, Type 1.
- .3 Adhesive for Use with Other Materials: Mastic type, synthetic rubber base, fungi-resistant, gun or trowel application.
- .4 Tape: 50 mm wide polyester self-adhering tape.

- 3 Execution
- 3.1 EXAMINATION
 - .1 Refer to Section 01 71 00.
 - .2 Ensure air seals and vapour retarders are in place.
- 3.2 RIGID BOARDS
 - .1 Unless indicated otherwise, secure rigid board insulation with adhesive, applied in three continuous beads per board length.
 - .2 Install insulation boards on wall surface either horizontally or vertically as required. Place insulation surface solidly against substrate and securely fasten.
 - .3 Do not crush insulation face when fastening with mechanical fasteners.
 - .4 Stagger side and end joints.
 - .5 Butt edges and ends tight to adjacent board and to protrusions.
- 3.3 BATTS AND BLANKETS
 - .1 Install mineral fibre batts and blankets to ULC-S702.2.
 - .2 Install batt insulation in spaces without gaps and voids.
 - .3 Fit insulation tight in spaces and tight to exterior side of facility service components within plane of insulation.
- 3.4 FIELD QUALITY CONTROL
 - .1 Notify Consultant and independent inspection company to inspect thermal insulation before, during and upon completion of installation.
- 3.5 PROTECTION
 - .1 Refer to Section 01 76 00.
 - .2 Protect insulation edges at end of each Working Day.
 - .3 Protect insulation in areas where welding will be carried out.
 - .4 Replace insulation damaged by others.
 - .5 Protect insulation requiring a thermal barrier in accordance with applicable regulatory requirements.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 22 00 - Concrete Unit Masonry.
- .2 Section 07 21 00 - Thermal Insulation.
- .3 Section 07 26 00 - Vapour Retarders.
- .4 Section 07 27 00 - Air Barriers.
- .5 Section 07 27 36 - Sprayed Foam Air Barrier.

1.2 REFERENCES

- .1 ASTM D1621-10: Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- .2 ASTM D1622/D1622M-14: Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- .3 ASTM D1623-17: Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
- .4 ASTM D2240-15(2021): Standard Test Method for Rubber Property-Durometer Hardness.
- .5 ASTM D2842-19: Standard Test Method for Water Absorption of Rigid Cellular Plastics.
- .6 ASTM D6226-15: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
- .7 ASTM E96/E96M-23: Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
- .8 CUFCA Manual for Installers of Spray Polyurethane Foam Thermal Insulation.
- .9 CAN/ULC-S102-2018 (REV1): Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .10 CAN/ULC-S705.1-18: Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density - Material Specification.
- .11 CAN/ULC-S705.2-2020: Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density - Application.
- .12 CAN/ULC-S718-2018: Standard for Site Quality Assurance Program for Spray Applied Polyurethane Foam.
- .13 CAN/ULC-S770-15 (R2020): Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams.

1.3 CERTIFICATES

- .1 Submit certificates as specified in Section 01 40 00.
- .2 Submit a copy of foam contractor's license under a recognized third-party quality assurance program.
- .3 Submit a copy of applicator certification issued by third-party.

1.4 TEST AND EVALUATION REPORTS

- .1 Submit test reports as specified in Section 01 33 00.

- .2 Test Reports: Manufacturer's standard test results indicating Products meet specified performance criteria, prepared by independent testing agency and current within past 5 years.
 - .1 Include results of CCMC air barrier system tests.

1.5 QUALIFICATIONS

- .1 Applicator: A firm employing persons certified as approved applicators in accordance with CAN/ULC-S718; including training and certification as an applicator for air barrier applications.
- .2 Independent Inspection Agency: A urethane foam insulation and air barrier system inspector certified in accordance with CAN/ULC-S718.

1.6 MOCK-UPS

- .1 Construct mock-ups as specified in Section 01 40 00.
- .2 Mock-Up: A 3 000 x 3 000 mm size mock-up panel, demonstrating typical conditions, including window corner condition, door corner condition, inside corner and outside corner.
- .3 Conduct the following tests on mock-up panel and report results for the following criteria:
 - .1 Sprayed foam insulation core density,
 - .2 Adhesion between transition sheet membrane and substrate,
 - .3 Adhesion between sprayed foam insulation and transition sheet membrane, and
 - .4 Cohesion or adhesion between sprayed foam insulation and substrate.
- .4 Verify results comply with inspector's daily report.
- .5 Accepted mock-ups will be used as the standard for acceptance of the Work.
- .6 Remove and replace installed Product that does not conform to accepted mock-up.
- .7 Remove mock-ups from Place of the Work upon Ready-for-Takeover.

1.7 DELIVERY STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver and store Product in original packaging, bearing manufacturer's name, quantity, expiry date, CCMC numbers, and other appropriate technical indicators and references.
- .3 Cold Weather Storage: Store Products during cold weather in heated storage area.

1.8 AMBIENT CONDITIONS

- .1 Apply Product when surface and ambient air temperatures are within manufacturer's prescribed limits.
- .2 Ventilate area as specified in Section 01 51 00.
- .3 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hour after application to maintain non-toxic, unpolluted, safe working conditions.

1.9 FIELD CONDITIONS

- .1 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.
- .2 Protect workers as recommended by insulation manufacturer.
- .3 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

1.10 WARRANTY

- .1 Submit standard Consumer Warranty for Rigid Insulation issued by Energy Conservation Contractors Warranty Corporation.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 BASF Canada Inc.
 - .2 Carlisle Spray Foam Insulation.
 - .3 Elastochem Specialty Chemicals, Inc.
 - .4 Genyk Inc.
 - .5 Huntsman Building Solutions.
 - .6 Soprema Inc.

- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 PERFORMANCE CRITERIA

- .1 Foamed-in-Place Urethane Insulation: Meeting the following properties:
 - .1 Density (ASTM D1622/D1622M): $\geq 28 \text{ kg/m}^3$.
 - .2 Open Cell Content (ASTM D6226): ≤ 10 percent.
 - .3 Long-Term Thermal Resistance (CAN/ULC-S770): $\text{RSI} \geq 1.80 @ 50 \text{ mm thick}$.
 - .4 Air Permeance: $\leq 0.02 \text{ L/s}\cdot\text{m}^2 @ 75 \text{ Pa}$.
 - .5 Flame Spread (CAN/ULC-S102): < 500 .
 - .6 Compressive Strength (ASTM D1621, 10% parallel to rise): $\geq 170 \text{ kPa}$.
 - .7 Tensile Strength (ASTM D1623): $\geq 200 \text{ kPa}$.
 - .8 Water Absorption by Volume (ASTM D2842): ≤ 4 percent.
 - .9 Water Vapour Permeance (ASTM E96/E96M): $\leq 60 \text{ ng/Pa}\cdot\text{s}\cdot\text{m}^2$ with outer skin in place.
 - .10 Product Global Warming Potential: $\text{GWP} \leq 1.0 \text{ kg CO}_2 \text{ eq / m}^2 @ \text{RSI } 1$.
- .2 Ensure continuity of building enclosure thermal barriers and air barriers in conjunction with materials specified in other Sections.
- .3 Seal gaps between building enclosure components and wall and roof opening frames.

2.3 MATERIALS

- .1 Foamed-in-Place Insulation (INS-FIP-1): To CAN/ULC-S705.1, Type 2; two-component, closed cell polyurethane cellular plastic foam, using HFO blowing agent; eg. Walltite v.5 by BASF Canada.
- .2 Primers: As recommended for specific substrate by CUFCA Manual for Installers of Spray Polyurethane Foam Thermal Insulation.
- .3 Transition Sheet Membrane: Air/vapour barrier sheet membrane, as specified in Section 07 27 00.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Ensure surfaces are free of frost, oil, grease, oxidation, dirt, loose paint, loose scale, or other deleterious material that would impair bond.
- .3 Ensure penetrating items are installed before commencing insulation application.

3.2 PREPARATION

- .1 Mask and cover adjacent areas to protect from overspray.
- .2 Apply primers for special conditions as recommended by manufacturer.
- .3 Cover wide joints with transition sheet membrane as specified in Section 07 27 00.
- .4 Clean area of work prior to application of sprayed foam insulation.

3.3 APPLICATION

- .1 Spray apply Product to CAN/ULC-S705.2, and CUFCA Manual for Installers of Spray Polyurethane Foam Thermal Insulation.
- .2 Apply sprayed foam insulation in consecutive layers of not less than 12 mm and not more than 25 mm thick each. Apply sufficient layers to achieve total thickness indicated.
- .3 Avoid formation of sub-layer air pockets.
- .4 Apply Product in overlapping layers, so as to obtain a smooth, uniform surface.
- .5 Maintain 75 mm clearance around chimneys, heating vents, steam pipes, recessed lighting fixtures and other heat sources.
- .6 Do not apply Product to inside of exit openings or electrical junction boxes.

3.4 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Service: Arrange for manufacturer's technical representative to regularly inspect application (minimum twice per week) and confirm that thermal barrier and air barrier systems are applied in strict accordance with CCMC requirements.
- .2 Conduct field inspection and testing in accordance with CAN/ULC-S718.
- .3 Test completed application daily for core density and cohesion/adhesion to substrate. Record results in daily report forms.
- .4 After Product has properly cured, conduct tests verifying adhesion between sprayed foam insulation and transition sheet membrane and between sprayed foam insulation and wall substrate; using CUFCA recommended equipment.
 - .1 Conduct adhesion tests at wall corners and building angles, at wall-to-slab junctions, and at wall-to-roof junctions.
 - .2 Perform one set of tests for every wall less than 30 metres in length. Perform two sets of tests for every wall greater than 30 metres and less than 60 metres in length, with an additional set of tests conducted for every additional 30 metres, or part thereof, in wall length.
 - .3 Where adhesion is determined to be lower than 110 kPa, remove defective Product, clean substrate and Provide new Product. Re-test as required at no additional cost to Owner.
- .5 Verify adhesion of transition sheet membranes at perimeters of openings. Conduct adhesion tests randomly on 15 percent of wall openings, and at every tenth column or beam.

3.5 TOLERANCES

- .1 Maximum Variation in Applied Thickness: Plus or minus 6 mm.

3.6 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Remove overspray from non-prescribed surfaces without causing damage to surfaces.

- .3 Remove protective covers from adjacent surfaces.

3.7 WASTE MANAGEMENT

- .1 Refer to Section 01 74 00.
- .2 On a daily basis, dispose of waste foam and decontaminate empty drums. Conform to authorities having jurisdiction.

3.8 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Protect completed installation from damage.
- .3 Make Good damage.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 22 00 - Concrete Unit Masonry.
- .2 Section 07 21 00 - Thermal Insulation.
- .3 Section 07 21 19.13 - Foamed-in-Place Urethane Insulation.
- .4 Section 07 27 00 - Air Barriers.
- .5 Section 07 52 00 - Modified Bituminous Membrane Roofing.
- .6 Section 07 92 00 - Joint Sealants.
- .7 Section 08 51 13 - Aluminum Windows.
- .8 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

- .1 ASTM E96/E96M-22ae1: Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
- .2 CAN/CGSB-51.34-M86: Vapour Barrier, Polyethylene Sheet for Use In Building Construction.
- .3 SWI Sealant and Caulking Guide Specification.

1.3 SEQUENCING

- .1 Sequence installation of Products in conjunction with other air and vapour barrier materials and seals.

1.4 PRODUCT DATA

- .1 Submit Product data as specified in Section 01 33 00.
- .2 Product Data: Manufacturer's standard data sheets, indicating Product characteristics, performance criteria and Product limitations.

1.5 MANUFACTURER'S INSTRUCTIONS

- .1 Submit manufacturer's instructions as specified in Section 01 33 00.
- .2 Manufacturer's Instructions: Manufacturer's standard installation guidelines, indicating preparation and installation requirements and techniques.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of bituminous membrane vapour retarders having Product considered acceptable for use:
 - .1 Carlisle Construction Materials.
 - .2 Elevate.
 - .3 Henry (a Carlisle Company).
 - .4 IKO Industries, Ltd.

- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 PERFORMANCE CRITERIA

- .1 Ensure continuity of building enclosure vapour retarder in conjunction with materials specified in other Sections.
- .2 Seal gaps between building enclosure components and opening frames.

2.3 MATERIALS

- .1 Plastic Sheet Vapour Retarder: To CAN/CGSB-51.34-M; polyethylene sheet, as follows:
 - .1 Thickness: 0.15 mm.
 - .2 Water Vapour Permeance (ASTM E96/E96M): $\leq 2.2 \text{ ng/Pa}\cdot\text{s}\cdot\text{m}^2$.
 - .3 Manufacturer and Product Name: eg. Super Six by Polytarp Products.
- .2 Bituminous Membrane Vapour Retarder: Self-adhering bituminous membrane with laminated top surface; as follows:
 - .1 Thickness: 0.76 mm.
 - .2 Core: SBS modified asphalt.
 - .3 Top Surface: Tri-laminate woven high density polyethylene.
 - .4 Water Vapour Permeance (ASTM E96/E96M): $\leq 1.5 \text{ Ng/Pa}\cdot\text{s}\cdot\text{m}^2$.
 - .5 Manufacturer and Product Name: eg. V-Force Vapour Barrier Membrane by Elevate.
- .3 Primer for Bituminous Membrane Vapour Retarder: Single-component, water-based primer; eg. V-Force WB Primer by Elevate.
- .4 Adhesive: Compatible with sheet barrier and substrate, permanently non-curing.
- .5 Joint Sealant: As specified in Section 07 92 00, types as follows:
 - .1 Plastic Sheets: Interior general purpose sealant, Type SEAL-INT-GP.
 - .2 Bituminous Membranes: Exterior flashing sealant, Type SEAL-EXT-FL.

3 Execution

3.1 PREPARATION

- .1 Ensure substrates are clean, dry and free of oil, grease, dirt, excess mortar and other contaminants.
- .2 Cure new concrete for minimum two weeks.
- .3 Prime substrate prior to applying self-adhering bituminous membranes.

3.2 INSTALLATION

- .1 Install Products to SWI Sealant and Caulking Guide Specification.
- .2 Plastic Sheet Vapour Retarders
 - .1 Position sheet joints or laps over firm bearing to achieve an effective and permanent seal.
 - .2 Seal laps, joints and terminations with joint sealant or sealer tape to ensure complete, continuous seal of building envelope.
- .3 Bituminous Membrane Vapour Retarders
 - .1 Apply self-adhered bituminous membranes over primed surface, from low points to high points, overlapping edges by 65 mm.
 - .2 Stagger end laps.
 - .3 Install membrane to avoid fishmouths and wrinkles.
 - .4 Roll membrane with a weighted roller wrapped in resilient material.

3.3 FIELD QUALITY CONTROL

- .1 Inspect vapour retarders prior to concealment and identify gaps, holes and punctures.
- .2 Seal gaps, holes and punctures in vapour retarder membranes with joint sealant, as specified in Section 07 92 00.
- .3 Request Consultant inspection of vapour retarders prior to concealment. Work that has been concealed prior to Consultant inspection will be exposed while Consultant remains at Place of the Work, inspected, and then only concealed upon Consultant acceptance.

3.4 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Clean extra materials from adjacent surfaces.
- .3 Leave a suitable substrate for subsequent installations.

END OF SECTION

- 1 General
- 1.1 RELATED SECTIONS
 - .1 Section 32 11 23 - Aggregate Base Courses.
- 1.2 REFERENCES
 - .1 ASTM D1709-22: Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
 - .2 ASTM E96/E96M-22ae1: Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
 - .3 ASTM E154/E154M-08a(2019): Standard Test Methods for Water Vapor Retarders Used in Contact with Earth under Concrete Slabs, on Walls, or as Ground Cover.
 - .4 ASTM E1643-18a: Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - .5 ASTM E1745-17: Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
- 1.3 PRODUCT DATA
 - .1 Submit Product data as specified in Section 01 33 00.
 - .2 Product Data: Manufacturer's standard data sheets, indicating properties and characteristics of sheet membranes, flashings, control and expansion joints, sealing at openings, projections, reglets, holes, slots, sleeves and special details.
- 1.4 TEST AND EVALUATION REPORTS
 - .1 Submit test reports as specified in Section 01 33 00.
 - .2 Test Reports: Complete set of after-conditioning results, as described in ASTM E1745.
- 1.5 QUALIFICATIONS
 - .1 Installer: A firm specializing in installing below-slab vapour retarders, having minimum 5 years documented experience.
- 1.6 DELIVERY, STORAGE AND HANDLING
 - .1 Refer to Section 01 60 00.
 - .2 Protect Products from rain and damage.
 - .3 Store membrane cartons on pallets and cover if left outside.
- 1.7 AMBIENT CONDITIONS
 - .1 Do not proceed with application during rainy or inclement weather.
- 1.8 WARRANTY
 - .1 Submit extended warranty in accordance with General Conditions of the Contract.
 - .2 Extended Warranty: For a period of 3 years, protecting against penetration of moisture resulting in buckling, blistering, cracking or delamination of flooring products.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 Stego Industries, LLC.
 - .2 W. R. Meadows of Canada Ltd.

- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 PERFORMANCE CRITERIA

- .1 Below-Slab Vapour Retarder: Preventing moisture migration through concrete slabs-on-fill to building interior, and having the following physical properties:
 - .1 Water Vapour Permeance (ASTM E96/E96M): $\leq 1.0 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$.
 - .2 Tensile Strength (ASTM E154/E154M): $\geq 9.1 \text{ kN/m}$.
 - .3 Puncture Resistance (ASTM D1709, Method B): $> 3500 \text{ g}$.

2.3 MATERIALS

- .1 Below-Slab Vapour Retarder: To ASTM E1745, Classes A, B & C; 0.20 mm thick resin-based single-ply sheet membrane; eg. Perminator 10 by W. R. Meadows of Canada Ltd.
- .2 Lapping Tape: 100 mm wide, as recommended by membrane manufacturer.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Ensure surfaces are unfrozen, clean, dry, smooth and free of voids.

3.2 PREPARATION

- .1 Level, tamp or roll aggregate base course.

3.3 INSTALLATION

- .1 Apply Products to ASTM E1643.
- .2 Provide permanent, monolithic vapour seal without voids or open seams, and completely covering pour area.
- .3 Ensure accessory materials are compatible with membrane and approved by membrane manufacturer.
- .4 Lap joints minimum 150 mm and continuously seal with lapping tape.
- .5 Place membrane collar around protrusions through concrete slab, including sewer pipes, water pipes, and utility inlets to create a positive seal between protrusions and membrane. Seal in place with lapping tape.
- .6 Seal membrane to vertical surfaces with lapping tape.

3.4 FIELD QUALITY CONTROL

- .1 Advise Consultant prior to installation and again on completion.
- .2 Do not allow concrete pour to commence until completed installation has been reviewed and accepted by Consultant.

3.5 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Protect completed installation and adjacent parts of the Work until covered by subsequent construction.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 22 00 - Concrete Unit Masonry.
- .2 Section 07 21 00 - Thermal Insulation.
- .3 Section 07 21 19.13 - Foamed-in-Place Urethane Insulation.
- .4 Section 07 26 00 - Vapour Retarders.
- .5 Section 07 27 36 - Sprayed Foam Air Barrier.
- .6 Section 07 42 43 - Composite Wall Panels.
- .7 Section 07 52 00 - Modified Bituminous Membrane Roofing.
- .8 Section 07 92 00 - Joint Sealants.
- .9 Section 08 12 13 - Hollow Metal Frames.
- .10 Section 08 51 13 - Aluminum Windows.

1.2 REFERENCES

- .1 ASTM D412-16: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
- .2 ASTM E96/E96M-22ae1: Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
- .3 ASTM E154/E154M-08a(2019): Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
- .4 ASTM E2178-21a: Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials.
- .5 SWI Sealant and Caulking Guide Specification.
- .6 CAN/ULC-S741-2008 (R2016): Standard for Air Barrier Materials - Specification.
- .7 CAN/ULC-S742-2011 (R2016): Standard for Air Barrier Assemblies - Specification.

1.3 SEQUENCING

- .1 Sequence installation in conjunction with other air and vapour barrier materials and seals.

1.4 PRODUCT DATA

- .1 Submit Product data as specified in Section 01 33 00.
- .2 Product Data: Manufacturer's standard data sheets, indicating Product characteristics, performance criteria and Product limitations.

1.5 MANUFACTURER'S INSTRUCTIONS

- .1 Submit manufacturer's instructions as specified in Section 01 33 00.
- .2 Manufacturer's Instructions: Manufacturer's standard installation instructions, indicating substrate preparation, and Product installation requirements and techniques.

1.6 QUALIFICATIONS

- .1 Applicators: A firm recognized by manufacturer as suitable for applying specified air barrier Products.

1.7 DELIVERY STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products in undamaged containers and original packaging indicating name of manufacturer and product.
- .3 Store roll materials on end in original packaging.
- .4 Store adhesives and primers at 5 degrees C to facilitate handling.
- .5 Keep solvent away from open flame or excessive heat.
- .6 Protect rolls from direct sunlight until ready for use.

1.8 AMBIENT CONDITIONS

- .1 Apply sheet membranes when ambient air temperature is above 5 degrees C.
- .2 Apply membranes only during dry conditions, and to dry substrates that are free of snow, ice and water.
- .3 Apply only dry materials, during weather that will not introduce moisture into assembly.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 Carlisle Construction Materials.
 - .2 Henry (a Carlisle Company).
 - .3 IKO Industries Ltd.
 - .4 Soprema Inc.
 - .5 Tremco.
 - .6 W. R. Meadows of Canada Limited.
- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 PERFORMANCE CRITERIA

- .1 Ensure continuity of building enclosure air barrier in conjunction with adjacent Products.
- .2 Seal gaps between building enclosure components and opening frames.

2.3 MATERIALS

- .1 Air/Vapour Barrier Sheet Membrane: To CAN/ULC-S741 and CAN/ULC-S742, Class A1; SBS rubberized asphalt sheet membrane, self-adhering grade; and as follows:
 - .1 Thickness: ≥ 1.0 mm.
 - .2 Air Leakage (ASTM E2178): < 0.02 L/s•m² @ 75 Pa.
 - .3 Water Vapour Permeance (ASTM E96/E96M, Method A): ≤ 1.71 ng/Pa•s•m².
 - .4 Elongation (ASTM D412 - Modified): 200 percent.
 - .5 Tensile Strength (ASTM D412 - Modified): 3.45 MPa.
 - .6 Puncture Resistance (ASTM E154/E154M): 178 N.
 - .7 Product and Manufacturer Name: eg. Blueskin SA by Henry (a Carlisle Company).

- .2 Air/Vapour Barrier Sealant: To CAN/ULC-S741 and CAN/ULC-S742, Class A1; single-component, trowel- or brush-applied solvent type synthetic rubber; and as follows:
 - .1 Air Leakage (ASTM E2178): $\leq 0.02 \text{ L/s}\cdot\text{m}^2 @ 75 \text{ Pa}$.
 - .2 Water Vapour Permeance (ASTM E96/E96M, Method A): $\leq 1.7 \text{ ng/Pa}\cdot\text{m}^2\cdot\text{s}$.
 - .3 Solids Content by Weight: 72 percent.
 - .4 Product and Manufacturer Name: eg. Air-Bloc 21 by Henry (a Carlisle Company).
- .3 Attachments: Galvanized steel bars and anchors.
- .4 Adhesive: Compatible with sheet barrier and substrate, permanently non-curing.
- .5 Primer: As recommended by self-adhering membrane manufacturer.
- .6 Joint Sealant: Exterior flashing sealant, Type SEAL-EXT-FL as specified in Section 07 92 00.

3 Execution

3.1 PREPARATION

- .1 Ensure surfaces are clean, dry and free of oil, grease, dirt, excess mortar and other contaminants.
- .2 Cure new concrete for minimum two weeks.
- .3 Fill spalled concrete or open mortar joints to an even plane.
- .4 Apply primer to porous surfaces designated to receive self-adhering sheet membranes.

3.2 INSTALLATION

- .1 Install Products to SWI Sealant and Caulking Guide Specification.
- .2 Provide air tight joints.
- .3 Seal Products completely around projections and penetrations.
- .4 Fully adhere sheet membranes to primed substrate, using consecutive weatherboard method.
- .5 Eliminate wrinkles, gaps, bubbles, air pockets and fishmouths.
- .6 Apply transition sheet membranes at openings and transitional connections.
- .7 Leave sufficient amount of excess membrane over top of parapet walls and around wall openings for tie-in by others.
- .8 Cut membrane neatly around penetrations. Use heated trowel to soften and form membrane. Seal with air/vapour barrier sealant.
- .9 Do not leave installed membranes exposed to UV or weather for more than 42 days.

3.3 FIELD QUALITY CONTROL

- .1 Inspect installed air barriers prior to concealment and identify gaps, holes and punctures.
- .2 Seal gaps, holes and punctures with air/vapour barrier sealant.
- .3 Request Consultant inspection of air barriers prior to concealment. Work that has been concealed prior to Consultant inspection will be exposed while Consultant remains at Place of the Work, inspected, and only concealed upon Consultant acceptance.

3.4 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Clean extra material from adjacent surfaces.
- .3 Leave suitable substrate for subsequent construction.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 22 00 - Concrete Unit Masonry.
- .2 Section 06 10 00 - Rough Carpentry.
- .3 Section 07 21 00 - Thermal Insulation.
- .4 Section 07 21 19.13 - Foamed-in-Place Urethane Insulation.
- .5 Section 07 26 00 - Vapour Retarders.
- .6 Section 07 27 00 - Air Barriers.
- .7 Section 07 42 43 - Composite Wall Panels.
- .8 Section 07 92 00 - Joint Sealants.
- .9 Section 08 12 13 - Hollow Metal Frames.
- .10 Section 08 51 13 - Aluminum Windows.

1.2 REFERENCES

- .1 SWI Sealant and Caulking Guide Specification.
- .2 CAN/ULC-S710.1-2019: Standard for Bead-Applied One Component Polyurethane Air Sealant Foam, Part 1: Material Specification.
- .3 CAN/ULC S710.2-11: Standard for Thermal Insulation - Bead Applied One-Component Polyurethane Air Sealant Foam, Part 2: Application.
- .4 CAN/ULC-S711.1-2019: Standard for Bead-Applied Two Component Polyurethane Air Sealant Foam, Part 1: Material Specification.
- .5 CAN/ULC S711.2-11: Standard for Thermal Insulation - Bead Applied Two-Component Polyurethane Air Sealant Foam, Part 2: Application.

1.3 SEQUENCING

- .1 Sequence installation of Products in conjunction with air barriers and vapour retarders.

1.4 PRODUCT DATA

- .1 Submit Product data as specified in Section 01 33 00.
- .2 Product Data: Manufacturer's standard data sheets, indicating material characteristics, performance criteria and Product limitations.

1.5 MANUFACTURER'S INSTRUCTIONS

- .1 Submit manufacturer's instructions as specified in Section 01 33 00.
- .2 Manufacturer's Instructions: Manufacturer's standard installation instructions, indicating preparation and installation requirements and techniques.

1.6 DELIVERY STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products in undamaged containers and original packaging indicating name of manufacturer and Product.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 DuPont de Nemours, Inc.
 - .2 Henkel Canada Corporation.

- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 PERFORMANCE CRITERIA

- .1 Ensure continuity of building enclosure air barrier in conjunction with Products specified in other Sections.
- .2 Seal gaps between building enclosure components and opening frames.

2.3 MATERIALS

- .1 Air Sealant Foam (ASF-1): To CAN/ULC-S710.1; one-component polyurethane sealant.
- .2 Air Sealant Foam (ASF-2): To CAN/ULC-S711.1; two-component polyurethane sealant.

3 Execution

3.1 PREPARATION

- .1 Ensure surfaces are clean, dry and free of oil, grease, dirt, excess mortar and other contaminants.

3.2 INSTALLATION

- .1 Install air sealant foam in accordance with authorities having jurisdiction.
- .2 Avoid overfilling restricted spaces.
- .3 Seal gaps between air barrier membranes and frames installed in openings.
- .4 Apply air sealant foam Type ASF-1 to cracks or openings 6 mm to 50 mm wide. Conform to CAN/ULC S710.2.
- .5 Apply air sealant foam Type ASF-2 to gaps over 50 mm wide, and to voids in hidden cavities. Conform to CAN/ULC S711.2.

3.3 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Clean extra material from adjacent surfaces.
- .3 Leave a suitable substrate for subsequent construction.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 22 00 - Concrete Unit Masonry.
- .2 Section 07 21 19.13 - Foamed-in-Place Urethane Insulation.
- .3 Section 07 62 00 - Sheet Metal Flashing and Trim.
- .4 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

- .1 AAMA 2605-22: Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (With Coil Coating Appendix).
- .2 ASTM A123/A123M-17: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .3 ASTM A153/A153M-23: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .4 ASTM B209/B209M-21a: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .5 ASTM B221M-21: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
- .6 ASTM D1781-98(2021): Standard Test Method for Climbing Drum Peel for Adhesives.
- .7 ASTM E283-19: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across The Specimen.
- .8 ASTM E331-00(2023): Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- .9 CSA S136-16: North American Specification for the Design of Cold-Formed Steel Structural Members.
- .10 CAN/ULC-S102-2018 (REV1): Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 SHOP DRAWINGS

- .1 Submit Shop Drawings as specified in Section 01 33 00.
- .2 Shop Drawings: Project-specific drawings, illustrating:
 - .1 Large scale details of members and materials, schedule of elevations, trim and closure pieces, soffits, fascia; detail and location of joints and gaskets, including joints necessary to accommodate thermal movement;
 - .2 Large scale details of brackets and anchorage devices and of connection details;
 - .3 Fully dimensioned layouts for positioning of brackets and anchorage devices to structures;
 - .4 Dimensions and thicknesses;
 - .5 Description of materials including catalogue numbers, Products' and manufacturer's names;
 - .6 Finish specifications; and
 - .7 Other pertinent data.

- .3 Submit documentation of:
 - .1 Thicknesses, profiles and descriptions of components used in assembly;
 - .2 Engineering calculations verifying assembly has been designed, constructed and attached to withstand forces anticipated for Project and will meet performance criteria required by applicable regulatory requirements.
 - .3 Ensure calculations are stamped, signed and dated by fabricator's design engineer.
- 1.4 SAMPLES
 - .1 Submit samples as specified in Section 01 33 00.
 - .2 Selection Samples: Duplicate 90 x 90 mm size prefinished metal samples, illustrating full range of available colours.
 - .3 Verification Samples: Duplicate 90 x 90 mm size samples for each panel type, illustrating selected finish, fabrication and anchorage method.
- 1.5 QUALIFICATIONS
 - .1 Fabricator's Design Engineer: A professional structural engineer experienced in designing composite panel systems, licensed to practice at Place of the Work.
 - .2 Fabricator and Installer: A firm specializing in fabricating and erecting composite panel assemblies, having minimum 5 years documented experience.
- 1.6 MOCK-UPS
 - .1 Construct mock-ups as specified in Section 01 40 00.
 - .2 Mock-Up Panel: A 1 220 x 1 220 mm size mock-up panel, demonstrating panel profiles, textures and colours; jointing and gasketing techniques; metal flashings; method of attachment to substrate. Include wall components such as air/vapour barrier membrane, through-wall flashing membranes, wall insulation and methods of drainage.
 - .3 Accepted mock-ups will be used as the standard for acceptance of the Work.
 - .4 Remove and replace installed Product that does not conform to accepted mock-up.
 - .5 Remove mock-ups from Place of the Work upon Ready-for-Takeover.
- 1.7 DELIVERY, STORAGE AND HANDLING
 - .1 Refer to Section 01 60 00.
 - .2 Deliver and store Products in original wrappings, cartons or containers clearly marked as to type, colour and manufacturer.
 - .3 Stack on wood blocking, clear of ground and tilted sufficiently to ensure no water remains on Products.
 - .4 Open bundles on underside to allow drainage from leaks or condensation.
- 1.8 WARRANTY
 - .1 Submit extended warranty in accordance with General Conditions of the Contract.
 - .2 Extended Warranty: For a period of 20 years, covering failure of factory-applied exterior finish.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of aluminum composite material having Product considered acceptable for use:
 - .1 3A Composites USA Inc.
 - .2 Alcoa Cladding Systems.
 - .3 Alcotex, Inc.
 - .4 Alucoil North America.
 - .5 Architectural Metals North America Corporation.
 - .6 Mitsubishi Chemical Composites America, Inc.
- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 DESCRIPTION

- .1 Aluminum Composite Panels (ACP): A dry-joint panel assembly, comprised of panels fabricated from aluminum composite material, and supported from a panel load transfer grid.

2.3 DESIGN CRITERIA

- .1 Design panel assembly to accommodate wind loading, weight carrying requirements and wind deflection limitation of L/800. Conform to CSA S136.
- .2 Design panel assembly as drained rain screen.
- .3 Design panel assembly to meet MMA Supplementary Standard SB-10, Nonresidential Category, Climate Zone 5.
- .4 Deflection Limits: Maintain integrity of panels and seals at design loading. Prevent permanent deformation of members caused by applied loads. Prevent deflection that could result in noise, breaking of adhesives or sealants, to cause them to touch other building components, or to break the integrity of the insulation thermal blanket or air/vapour barrier seal.
- .5 Design anchors, fasteners and braces so as to limit their structural stress to not more than 50 percent of the allowable stress when maximum load conditions are applied.
- .6 Panel Removal: Designed as a non-progressive system, allowing removal of any individual panel without necessitating removal of adjacent components.
- .7 Structural Movement: Design system to accommodate movement of supporting structural framing without causing bowing, buckling, delamination, oil canning, excessive stress on fasteners, or any other detrimental effects.
- .8 Thermal Movements: Design system to accommodate thermal movements from ambient and surface temperature changes. Prevent buckling, opening of joints, overstressing of components, failure of connections and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.
 - .1 Temperature Change: 20 degrees C ambient, and 40 degrees C material surfaces.

2.4 PERFORMANCE CRITERIA

- .1 Aluminum Composite Panels (ACP): Meeting the following performance criteria:
 - .1 Air Infiltration (ASTM E283): Maximum air leakage of 0.3 L/m² when tested at pressure difference of 75 Pa.
 - .2 Water Penetration (ASTM E331): No water penetration when tested at pressure difference of 300 Pa.

2.5 MATERIALS

- .1 Sheet Aluminum: To ASTM B209/B209M, 3105-H14 alloy; 0.51 mm thick.
- .2 Extruded Aluminum: To ASTM B221M, 6063 alloy, T5 temper.
- .3 Bituminous Coating: Fibrous asphalt emulsion.
- .4 Joint Sealant: Exterior weatherseal sealant, Type SEAL-EXT as specified in Section 07 92 00.

2.6 COMPONENTS

- .1 Aluminum Composite Material (ACM): Front and rear faces of sheet aluminum, factory bonded to fire-rated inorganic (FR) core; and having the following physical properties:
 - .1 Thickness: 4 mm.
 - .2 Surface Burning Characteristics (CAN/ULC-S102):
 - .1 Flame Spread Index = 0.
 - .2 Smoke Developed Index ≤ 30 .
 - .3 Bond Integrity (ASTM D1781): No adhesive failure of bond between core and skins.
 - .4 Finish: Metallic paint coating.
 - .5 Product and Manufacturer Name: eg. Alucobond Plus by 3A Composites USA Inc.
- .2 Panel Load Transfer Grid: 1.2 mm thick galvanized steel hat bars, adjustable Z-bars or combination clip and Z-bar.
- .3 Sills: Matching thickness and finish as panels; complete with reinforced back-up splice plates at joints and directional changes.
- .4 Metal Trim and Flashing: 1.5 mm thick aluminum, finish to match panels.
- .5 Fasteners: Stainless steel; concealed type; as recommended by panel manufacturer.
- .6 Thermal Spacers: Thermal isolation clip capable of supporting vertical and horizontal subgirts; sizes as indicated on Drawings; ISO Clip by Northern Facade.

2.7 FABRICATION

- .1 Shop fabricate Products as far as possible.
- .2 Fabricate panels from aluminum composite material to sizes, depths and thicknesses as indicated on accepted Shop Drawings.
- .3 Layout cutting, punching and forming at Shop Drawing stage to avoid cutting at Place of the Work.
- .4 Fabricate system with straight lines, square corners or smooth bends, free from twists or warps, kinks, dents and other imperfections which may affect appearance or serviceability of installed system.
- .5 Fabricate system to have flush appearance from exterior, with no surface attachments or other irregularities, and with no reveal other than module joint width.
- .6 Align panels with no lap or reveal other than joint width to permit expansion and contraction.
- .7 Use metal of sufficient thickness, configured to adequate detail and sufficiently supported to ensure adequate strength and stiffness to resist distortion of finished surfaces.
- .8 Dress exposed edges and ends smooth and free of sharp edges.
- .9 Fabricate panels with flanges on all sides, framed with aluminum extrusions. Include uniformly radiused corners with factory welded connections. Grind smooth.