

**SECTION 061000
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural dimension lumber framing.

1.02 RELATED REQUIREMENTS

- A. Section 076200 - Sheet Metal Flashing and Trim: Sill flashings.
- B. Section 092116 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019.
- C. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing 2003 (Reapproved 2017).
- D. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2019.
- E. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing 2019a.
- F. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings 2015.
- G. ICC-ES AC380 - Acceptance Criteria for Termite Physical Barrier Systems 2014, with Editorial Revision (2017).
- H. PS 1 - Structural Plywood 2009.
- I. PS 2 - Performance Standard for Wood-Based Structural-Use Panels 2010.
- J. PS 20 - American Softwood Lumber Standard 2020.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
 - 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.

- . Stud Fram ng 2 by 2 through 2 by 6 (50 by 50 through 50 by 150)):
 1. Species: Any allowed under referenced grading rules.
 2. Species: Douglas Fir-Larch.
 3. Grade: No. 2.

2.03 STRUCTURAL COMPOSITE LUMBER

- A. At Contractor's option, structural composite lumber may be substituted for concealed dimension lumber and timbers.
- B. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.

2.04 CONSTRUCTION PANELS

- A. Subflooring: Any PS 2 type, rated Sheathing.
 1. Bond Classification: Exposure 1.
 2. Span Rating: 48.
 3. Performance Category: 3/4 PERF CAT.
- B. Roof Sheathing: Any PS 2 type, rated Structural I Sheathing.
 1. Bond Classification: Exterior.
 2. Span Rating: 60.
 3. Performance Category: 3/4 PERF CAT.
- C. Wall Sheathing: Extruded Polystyrene (XPS) board insulation, ASTM C578.
 1. Board Size: 48 by 96 inch (1220 by 2440 mm).
 2. Board Thickness: [1 1/2] inch ([] mm).
 3. Board Edges: Tongue-and-groove.
 4. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.0 (0.88) per 1 inch (25.4 mm) at 75 degrees F (24 degrees C) mean temperature using ASTM C177 test method.

2.05 ACCESSORIES

- A. Fasteners and Anchors:
 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
- B. Termite-Resistant Sill Flashing: Self-adhesive membrane; polyethylene film bonded to sealant.
 1. Thickness: 40 mils (0.040 inch) (1 mm).
 2. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
- C. Sill Flashing: As specified in Section 076200.
- D. Subfloor Adhesives: Waterproof, air cure type, cartridge dispensed; adhesives designed for subfloor applications and complying with either ASTM C557 or ASTM D3498.
- E. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.

PART 3 EXECUTION

3.01 PREPARATION

- A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches (100 mm) and seal.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.03 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and

- installation of permanent backing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWC (WFCM) Wood Frame Construction Manual.
- E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- C. Provide the following specific non-structural framing and blocking:
 1. Cabinets and shelf supports.
 2. Wall brackets.
 3. Handrails.
 4. Grab bars.
 5. Towel and bath accessories.
 6. Wall-mounted door stops.
 7. Chalkboards and marker boards.
 8. Wall paneling and trim.
 9. Joints of rigid wall coverings that occur between studs.

3.05 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

3.06 INSTALLATION OF CONSTRUCTION PANELS

- A. Subflooring: Glue and nail to framing; staples are not permitted.
- B. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
 1. At long edges provide solid edge blocking where joints occur between roof framing members.
 2. Nail panels to framing; staples are not permitted.
- C. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails or screws.
 1. Use plywood or other acceptable structural panels at building corners, for not less than 96 inches (2440 mm), measured horizontally.

3.07 TOLERANCES

- A. Framing Members: 1/4 inch (6 mm) from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet (1 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.
- C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

3.08 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.

3.09 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 017419 - Construction Waste Management and Disposal.
 1. Comply with applicable regulations.
 2. Do not burn scrap on project site.
 3. Do not burn scraps that have been pressure treated.

- . Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

**SECTION 062000
FINISH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Wood door frames, glazed frames.
- C. Wood casings and moldings.

1.02 RELATED REQUIREMENTS

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 081416 - Flush Wood Doors.
- C. Section 099123 - Interior Painting: Painting of finish carpentry items.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014, with Errata (2018).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1 2017, with Errata (2019).
- C. PS 1 - Structural Plywood 2009.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide manufacturer's product data, storage and handling instructions for factory-fabricated units.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated units to project site in original packages, containers or bundles bearing brand name and identification.
- B. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.
- C. Protect from moisture damage.
- D. Handle materials and products to prevent damage to edges, ends, or surfaces.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Standard: Economy Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Interior Woodwork Items:
 - 1. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.
 - 2. Window Sills: Clear fir; prepare for transparent finish.
 - 3. Stairs, Balustrades, and Handrails: Clear fir; prepare for stained finish.

2.02 WOOD-BASED COMPONENTS

2.03 LUMBER MATERIALS

2.04 SHEET MATERIALS

- A. Softwood Plywood, Not Exposed to View: Any face species, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.
- B. Softwood Plywood, Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.
 - 1. Grading: Certified by the American Plywood Association.

.05 FAST GS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

2.06 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Lumber for Shimming and Blocking: Softwood lumber of Pine species.
- C. Wood Filler: Solvent base, tinted to match surface finish color.

2.07 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.08 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.

3.03 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

END OF SECTION

**SECTION 07 1300
SHEET WATERPROOFING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sheet Waterproofing:
 - 1. Self-adhered HDPE sheet membrane.
 - 2. Underslab HDPE reinforced sheet membrane.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete substrate.
- B. Section 07 2100 - Thermal Insulation: Insulation used for protective cover.

1.03 ABBREVIATIONS

- A. HDPE - High-Density Polyethylene.

1.04 REFERENCE STANDARDS

- A. ASTM D5295/D5295M - Standard Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems 2018.
- B. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover 2008a, with Editorial Revision (2013).
- C. NRCA (WM) - The NRCA Waterproofing Manual 2005.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for membrane.

1.06 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until liquid or mastic accessories have cured.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 WATERPROOFING APPLICATIONS

- A. Self-Adhered HDPE Sheet Membrane:
 - 1. Location: Basement walls, below grade.
 - 2. Cover with Rigid Insulation.
- B. Underslab HDPE Reinforced Sheet Membrane:
 - 1. Location: Under concrete slab.

2.02 MEMBRANE MATERIALS

- A. Self-Adhered HDPE Sheet Membrane: Recommended by manufacturer for placement below concrete slabs and on outside face of below grade walls before placement of concrete.
 - 1. Sheet Thickness: 32 mil, 0.032 inch, minimum.
 - 2. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.
- B. Underslab HDPE Reinforced Sheet Membrane: Sheet membrane with cross-laminated, high-density HDPE backing laminated to waterproofing adhesive compound integrated into nonwoven geotextile fabric.
 - 1. Application: Install horizontally over prepared sub bases with concrete slab on grade.
 - 2. Sheet Thickness: 85 mil, 0.085 inch, minimum.
 - 3. Puncture Resistance: 217 lb, minimum, in accordance with ASTM E154/E154M.

2.03 ACCESSORIES

- A. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and waterproofing materials.
- B. Protection Board: Rigid insulation as specified in Section 07 2100.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.
- C. Verify items that penetrate surfaces to receive waterproofing are securely installed.

3.02 PREPARATION

- A. Protect adjacent surfaces from damage not designated to receive waterproofing.
- B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.
- C. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.
- D. Fill non-moving joints and cracks with a filler compatible with waterproofing materials.
- E. Concrete Surfaces for Adhesive Bonding: Prepare concrete substrate according to ASTM D5295/D5295M.
 - 1. Remove substances that inhibit adhesion including form release agents, curing compounds admixtures, laitance, moisture, dust, dirt, grease and oil.
 - 2. Repair surface defects including honeycombs, fins, tie holes, bug holes, sharp offsets, rutted cracks, ragged corners, deviations in surface plane, spalling and delaminations, as described in the reference standard.
 - 3. Remove and replace areas of defective concrete as specified in Section 03 3000.
 - 4. Prepare concrete for adhesive bonded waterproofing using mechanical or chemical methods described in the referenced standard.
 - 5. Test concrete surfaces as described in the referenced standards. Verify surfaces are ready to receive adhesive bonded waterproofing membrane system.

3.03 INSTALLATION - MEMBRANE

- A. Install membrane waterproofing in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- B. Roll out membrane, and minimize wrinkles and bubbles.
- C. Self-Adhering Membrane: Remove release paper layer, and roll out onto substrate with a mechanical roller to provide full contact bond.
- D. Overlap edges and ends, minimum 3 inches, seal permanently waterproof by method recommended by manufacturer, and apply uniform bead of sealant to joint edge.
- E. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.
- F. Weather lap joints on sloped substrate in direction of drainage, and seal joints and seams.
- G. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.
- H. Seal membrane and flashings to adjoining surfaces.

3.04 INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD

- A. Place drainage panel directly against membrane, butt joints, place to encourage drainage downward. Scribe and cut boards around projections, penetrations, and interruptions.
- B. Place protection board directly against drainage panel; butt joints. Scribe and cut boards around projections, penetrations, and interruptions.
- C. Adhere Rigid Insulation to substrate with compatible adhesive.

3.05 PROTECTION

- A. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION

**SECTION 072100
THERMAL INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation and integral vapor retarder at perimeter foundation wall, underside of floor slabs, over roof sheathing, and on the exterior of the exterior wall .
- B. Batt insulation in exterior wall and roof construction.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2019.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
- D. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C 2019a.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.
- D. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- E. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of contractor accreditation and installer certification on project site during and after installation. Present on-site documentation upon request.

1.04 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Evaluated Materials Program (EAP); www.airbarrier.org/#sle: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 3. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.0 (0.88) per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
- B. Extruded Polystyrene (XPS) Continuous Insulation (CI) Board: Complies with ASTM C578, and manufactured using carbon black technology.
 - 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.

3. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.0 (0.88), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
4. Board Size: 48 inch by 96 inch (1220 mm by 2440 mm).
5. Board Thickness: 1-3/4 inch (44.5 mm).
6. Board Edges: Shiplap, at long edges.

2.03 BATT INSULATION MATERIALS

- A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.
- B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
- C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
 1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.

END OF SECTION

**SECTION 07 3113
ASPHALT SHINGLES**

PART 1 GENERAL

ASPHALT SHINGLES ARE DEDUCT ALTERNATE #3

2.01 SECTION INCLUDES

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection, underlayment, and valley protection.
- C. Associated metal flashings and accessories.

2.02 RELATED REQUIREMENTS

- A. Section 07 6200 - Sheet Metal Flashing and Trim: Edge and cap flashings.
- B. Section 07 7123 - Manufactured Gutters and Downspouts.

2.03 REFERENCE STANDARDS

- A. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing 2017.
- B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2019.
- C. ASTM D3161/D3161M - Standard Test Method for Wind-Resistance of Steep Slope Roofing Products (Fan-Induced Method) 2020.
- D. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules 2019.
- E. ASTM D6380/D6380M - Standard Specification for Asphalt Roll Roofing (Organic Felt) 2003 (Reapproved 2018).
- F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.
- G. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings 2020a.
- H. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples 2018a.
- I. NRCA (RM) - The NRCA Roofing Manual 2019.
- J. UL (DIR) - Online Certifications Directory Current Edition.

2.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating material characteristics.
- C. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

2.05 QUALITY ASSURANCE

- A. Products are Required to Comply with Fire or Wind Resistance Criteria: UL (DIR) listed and labeled.

2.06 FIELD CONDITIONS

- A. Do not install shingles or eave protection membrane when surface temperatures are below 45 degrees F.

2.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

3.01 ASPHALT SHINGLES

- A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462.
 - 1. Fire Resistance: Class A, complying with ASTM E108.
 - 2. Wind Resistance: Class A, when tested in accordance with ASTM D3161.
 - 3. Weight: 30# lb/100 sq ft.

4. Self-sealing type.
5. Style: Square.
6. Color: As selected by Architect.

3.02 SHEET MATERIALS

- A. Roll Roofing:
 1. Smooth Surfaced Roll Roofing: Asphalt-coated organic felt, with smooth asphalt coating both sides, complying with ASTM D6380/D6380M, Class S, Type III, 51.1 lb/100 sq ft.
- B. Eave Protection Membrane:
 1. Eave Protection Membrane: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
- C. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 22 mil total thickness; with strippable release film and woven polypropylene sheet top surface.
 1. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 2. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
 3. Water Vapor Permeance: 0.067 perm, when tested in accordance with ASTM E96/E96M, Procedure A (desiccant method).
 4. Performance: Meet or exceed requirements for ASTM D226/D226M, Type II asphalt-saturated organic felt.

3.03 ACCESSORIES

- A. Roofing Nails: Standard round wire shingle type, galvanized steel or stainless steel, minimum 3/8 inch head diameter, 12 gauge, 0.109 inch nail shank diameter, 1-1/2 inch long and complying with ASTM F1667.
- B. Lap Cement: Fibrated cutback asphalt type, recommended for use in application of underlayment, free of toxic solvents.
- C. Plastic Ridge Vents: Extruded plastic with vent openings that do not permit direct water or weather entry; flanged to receive shingles.

3.04 METAL FLASHINGS

- A. Metal Flashings: Provide sheet metal eave edge, gable edge, ridge, ridge vents, open valley flashing, and other flashing indicated.
 1. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
 2. Hem exposed edges of flashings minimum 1/4 inch on underside.
- B. Sheet Metal: Galvanized steel, as specified in Section 07 6200.

PART 3 EXECUTION

4.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.
- B. Verify that roof deck is of sufficient thickness to accept fasteners.
- C. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- D. Verify roof openings are correctly framed.
- E. Verify deck surfaces are dry, free of ridges, warps, or voids.

4.02 PREPARATION

- A. Seal roof deck joints wider than 1/16 inch as recommended by shingle manufacturer.
- B. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.
- C. Broom clean deck surfaces before installing underlayment or eave protection.
- D. Install eave edge flashings tight with fascia boards, weather lap joints 2 inches and seal with plastic cement, and secure flange with nails spaced ["] inches on center.

4.03 INSTALLATION - EAVE PROTECTION MEMBRANE

- A. Install eave protection membrane from eave edge to minimum 2 ft up-slope beyond interior face of exterior wall.

- B. Install eave protection membrane in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.

4.04 **INSTALLATION - UNDERLAYMENT**

- A. Underlayment At Roof Slopes Up to 4:12: Install two layers of underlayment over area not protected by eave protection, with ends and edges weather lapped minimum 4 inches, stagger end laps of each consecutive layer, and nail in place.
- B. Underlayment At Roof Slopes Greater Than 4:12: Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches, stagger end laps of each consecutive layer, nail in place, and weather lap minimum 4 inches over eave protection.
- C. Weather lap and seal watertight with plastic cement any items projecting through or mounted on roof.

4.05 **INSTALLATION - VALLEY PROTECTION**

- A. Install one ply of smooth surfaced roll roofing, minimum 18 inches wide, centered over valleys.
- B. Weather lap joints minimum 2 inches.
- C. Nail in place minimum 18 inches on center, 1 inch from edges.

4.06 **INSTALLATION - METAL FLASHING AND ACCESSORIES**

- A. Install flashings in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
- C. Secure in place with nails at ["] inches on center, and conceal fastenings.
- D. Items Projecting Through or Mounted on Roofing: Flash and seal weather tight with plastic cement.

4.07 **INSTALLATION - SHINGLES**

- A. Install shingles in accordance with manufacturer's instructions manufacturer's instructions and NRCA (RM) applicable requirements.
 - 1. Fasten individual shingles using two nails per shingle, or as required by manufacturer and local building code, whichever is greater.
 - 2. Fasten strip shingles using four nails per strip, or as required by manufacturer and local building code, whichever is greater.
- B. Place shingles in straight coursing pattern with 5 inch weather exposure to produce double thickness over full roof area, and provide double course of shingles at eaves.
- C. Project first course of shingles 3/4 inch beyond fascia boards.
- D. Extend shingles 1/2 inch beyond face of gable edge fascia boards.
- E. Extend shingles on one slope across valley and fasten, trim shingles from other slope 2 inches from valley center line to achieve closed cut valley, and concealing valley protection.
- F. After installation, place one daub of plastic cement, one inch diameter under each individual shingle tab exposed to weather, to prevent lifting.
- G. Coordinate installation of roof mounted components or work projecting through roof with weather tight placement of counterflashings.
- H. Complete installation to provide weather tight service.

END OF SECTION

**SECTION 074113
METAL ROOF PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural roofing system of preformed steel panels.

1.02 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Roof sheathing.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2019.
- C. ASTM D4869/D4869M - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing 2016a.
- D. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments 2012, with Editorial Revision (2015).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Storage and handling requirements and recommendations.
 - 2. Installation methods.
 - 3. Specimen warranty.
- C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
 - 1. Show work to be field-fabricated or field-assembled.
- D. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.05 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of five years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design:
 - 1. Metal Roof Panels: Profile; 2" Mechanical Lock manufactured by Pro-Tech Steel.
 - 2. Metal Soffit Panels: Tru Vent, Hidden Vent Soffit manufactured by Quality Edge.

2.02 METAL ROOF PANELS

- A. Metal Roof Panels: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Metal Panels: Factory-formed panels with factory-applied finish.
 - 1. Profile: Standing seam, with minimum 2.0 inch (51 mm) seam height; concealed fastener system for field seaming with special tool.
 - 2. Profile: Batten seam, with separate snap-on battens of same metal as panels; concealed fastener system.
 - 3. Profile: Lapped seam, with integral sealant bead and [] fastener system.
 - 4. Texture: Smooth.
 - 5. Length: Maximum possible length to minimize lapped joints. Where lapped joints are unavoidable, space laps so that each sheet spans over three or more supports.

- 6. Width: Maximum panel coverage of 16 inches (406 mm).
- C. Metal Soffit Panels:
 - 1. Profile: Style as indicated, with venting provided.
 - 2. Material: Precoated steel sheet, 22 gage, 0.0299 inch (0.76 mm) minimum thickness.
 - 3. Color: As selected by Architect from manufacturer's standard line.

2.03 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.04 FABRICATION

- A. Panels: Provide field fabricated panels with applied finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.

2.05 FINISHES

- A. Finish per Manufacture's standard coating, Color to be selectred by Architect and Owner from manufactuers standard colors.

2.06 ACCESSORIES

- A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, closure strips, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
- B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish.
- C. Sealants:
 - 1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
 - 2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
- D. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 22 mil (0.55 mm) total thickness; with strippable release film and woven polypropylene sheet top surface.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.
- B. Coordinate installation of waterproof membrane over roof sheathing with 061000.
- C. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.
- D. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

- A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
 - 1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.

2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.
- B. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, equipment curbs, rib closures, ridge closures, and similar roof accessory items.
 - C. Install roofing felt and building paper slip sheet on roof deck before installing preformed metal roof panels. Secure by methods acceptable to roof panel manufacturer, minimizing use of metal fasteners. Apply from eaves to ridge in shingle fashion, overlapping horizontal joints a minimum of 2 inches (50 mm) and side and end laps a minimum of 3 inches (75 mm). Offset seams in building paper and seams in roofing felt.
 - D. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.
 1. Incorporate concealed clips at panel joints, and apply snap-on battens to provide weathertight joints.
 2. Provide sealant tape or other approved joint sealer at lapped panel joints.
 3. Install sealant or sealant tape, as recommended by panel manufacturer, at end laps and side joints.

3.04 **CLEANING**

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.05 **PROTECTION**

- A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.
- B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION

**SECTION 074 19
STEEL SIDING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Steel siding for exterior walls.
- B. Trim, flashings, accessories, and fasteners for steel siding.

1.02 RELATED REQUIREMENTS

- A. Section 076200 - Sheet Metal Flashing and Trim: Metal flashings and trim associated with metal siding.
- B. Section 079200 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

1.03 REFERENCE STANDARDS

- A. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process 2010 (Reapproved 2015).
- B. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates 2016.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Siding materials, underlayment, flashings, fasteners and accessories.
 - 3. Dimensions, physical properties, and typical details.
 - 4. Storage and handling requirements and recommendations.
 - 5. Installation methods.
- C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing brand name and manufacturer's identification until ready for installation.
- B. Verify quantities and condition immediately upon receipt; remove damaged materials from site, and coordinate with manufacturer to replace with new materials meeting specified requirements.
- C. Store products off the ground, within manufacturer's temperature and environmental limits, away from moisture, protected from traffic and construction activities, and minimize on-site storage prior to installation.

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a two year period after Date of Substantial Completion.
- C. Manufacturer's Warranty: Provide manufacturer's standard lifetime, non-prorated, transferable warranty, including 50 year hail protection warranty.
- D. Manufacturer's warranty on siding and trim accessories finishes to cover the following:
 - 1. Color fading of not more than five Hunter color-difference units when tested in accordance with ASTM D2244.
 - 2. Warranty Period: Based on specific finish system.
 - a. SMP (Silicone-Modified Polyester): 15 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Siding:
 - 1. TruCedar Seamless.
 - 2. Substitutions: See Section 016000 - Product Requirements.

2.02 STEEL SIDING

- A. Type 6" Board and Batten , Vertical Steel Siding:
 - 1. Site-formed steel siding.
 - 2. Material: Precoated steel sheet, 26 gage, 0.0179 inch (0.45 mm) minimum base metal thickness.
 - 3. Profile: Board and Batten, Single 6-Inch; 6 inches (152 mm) wide; 6 inches (152 mm) exposure.
 - 4. Nailing Hem: Single layer, with 1-1/8 inch (28 mm) elongated nail holes at maximum 1-5/8 inches (41 mm) on center.
 - 5. Length: 10 feet (3 m), minimum.
 - 6. Finish: Shop pre-coated with manufacturer's standard per manufacturer coating system.
 - 7. Color: As selected by Architect from manufacturers full range of available colors.
 - 8. Texture: Woodgrain.
- B. Type [_____], Steel Fascia:
 - 1. Material: Precoated steel sheet, 26 gage, 0.0179 inch (0.45 mm) minimum base metal thickness.
 - 2. Dimensions: 6 inches (152 mm) wide by 10 feet (3.04 m) long.
- C. Type TruLine 21.5 NFA , Steel Soffit:
 - 1. Material: Precoated steel sheet, 26 gage, 0.0179 inch (0.45 mm) minimum base metal thickness.
 - 2. Profile: Tru Bead Jet 45 vented.
 - 3. Dimensions: 12 inches (305 mm) wide by 12 feet (3.65 m) long.
 - 4. Ventilation: Provide manufacturer's standard of net free area.

2.03 MATERIALS

- A. Precoated Steel Sheet: Aluminum-zinc alloy-coated steel sheet, ASTM A792/A792M, Commercial Steel (CS)) or Forming Steel (FS) with AZ50/AZM150 coating; continuous coil-coated on exposed surfaces with specified finish coating, and manufacturer's standard panel back coating.

2.04 ACCESSORIES

- A. Fasteners: Hot dipped galvanized; non-staining, of size and strength to securely and rigidly retain the work; prefinished to match siding finish.
- B. Flashing: Siding manufacturer's standard, factory-finished flashing accessories.
- C. Finish: Shop precoated with manufacturer's standard SMP (silicone-modified polyester) coating system.
 - 1. Color: As selected by Architect from manufacturer's full range of available colors.
 - 2. Texture: Smooth.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate conditions before beginning installation.
- B. Verify dimensions and acceptable substrate condition.
- C. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory conditions before proceeding.
- D. Do not proceed with installation until unacceptable conditions have been corrected.

3.02 PREPARATION

- A. Surface Preparation: Prepare surfaces as recommended by manufacturer.

3.03 INSTALLATION

- A. Install steel siding, soffit, trim, and accessories in accordance with manufacturer's written instructions.
- B. Attach siding using manufacturers recommended fasteners, sealants, and adhesives, allowing for thermal expansion.
- C. Vertical Board and Batten: Work from corner to corner; adjust fields as recommended by manufacturer.

- . Install joint sealants as specified in 079200 for a watertight installation.
- E. Where dissimilar materials are in contact, prevent galvanic action as recommended by manufacturer.

3.04 CLEANING

- A. Remove grease and oil films, excess joint sealer, handling marks, and other installation debris from steel siding, leaving siding clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to material finishes.
- B. Upon completion of installation, thoroughly clean prefinished steel surfaces.
- C. Remove excess materials and debris from project site.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

**SECTION 07 7123
MANUFACTURED GUTTERS AND DOWNSPOUTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pre-finished aluminum gutters and downspouts.
- B. Precast concrete splash pads.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- C. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings 2014.
- D. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Comply with SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on prefabricated components.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gutters and Downspouts:

2.02 MATERIALS

- A. Polyvinyl Chloride (PVC): ASTM D2665, virgin vinyl, SDR 35 pipe and fittings, high impact type, colorfast; color as selected.
- B. Pre-Finished Aluminum Sheet: ASTM B209 (ASTM B209M); 0.032 inch thick.
 - 1. Finish: Plain, shop pre-coated with PVDF (polyvinylidene fluoride) coating.
 - 2. Color: As selected from manufacturer's standard colors.

2.03 COMPONENTS

- A. Gutters: Polyvinyl chloride (PVC); rectangular profile:
- B. Downspouts: Polyvinyl chloride (PVC); rectangular profile:
- C. Anchors and Supports: Profiled to suit gutters and downspouts.
 - 1. Anchoring Devices: In accordance with SMACNA requirements.
 - 2. Gutter Supports: Brackets.
 - 3. Downspout Supports: Brackets.
- D. Fasteners: Galvanized steel , with soft neoprene washers.

2.04 ACCESSORIES

- A. Splash Pads: Precast concrete type, size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.

2.05 FABRICATION

- A. Form gutters and downspouts of profiles and size indicated.
- B. Fabricate with required connection pieces.
- C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; seal watertight.

Manufactured Gutters and
Downspouts

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

- A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Slope gutters 1/2" in 10'-0" .

END OF SECTION

**SECTION 07 7200
ROOF ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Snow guards.
- B. Snow guards not required on asphalt shingle rooves, if deduct alternate #2 is accepted, remove price of snow guards from bid.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 SNOW GUARDS

- A. Unit Snow Guards: Individual projecting metal shapes, set between roofing shingles/tiles, and mechanically fastened to roof deck.
 - 1. Projecting Metal Shapes: Zinc plated steel, triangular spike design.
 - 2. Placement: As indicated on drawings.
- B. Fence Type Snow Guard: Continuous snow guard; manufacturer's standard pipe, bar, channel, or solid rod, set in brackets or posts, with optional plates and metal trim to match roof.
 - 1. Brackets: Zinc plated steel.
 - 2. Pipe or Square Tube: Galvanized steel.
 - 3. Clamps for Standing Seam Roof: Aluminum clamps attached to standing seams of roof panels; for attachment of fence type snow guard.
 - a. Seam Profile: Selected by Architect from manufacturer's standard range; match profile of metal roof.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

- A. Clean installed work to like-new condition.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 079200 JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.
- B. Section 071300 - Sheet Waterproofing: Sealing cracks and joints in waterproofing substrate surfaces using materials specified in this section.
- C. Section 072500 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
- D. Section 087100 - Door Hardware: Setting exterior door thresholds in sealant.
- E. Section 088000 - Glazing: Glazing sealants and accessories.

1.03 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- C. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2018.
- D. ASTM C1311 - Standard Specification for Solvent Release Sealants 2014.
- E. SCAQMD 1168 - Adhesive and Sealant Applications 1989 (Amended 2017).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Joints between different exposed materials.
 - c. Other joints indicated below.
 - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Other joints indicated below.
 - 3. Do not seal the following types of joints.
 - a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - c. Joints where installation of sealant is specified in another section.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
 - 1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
 - 2. Lap Joints between Manufactured Metal Panels: Butyl rubber, non-curing.
- C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
- D. Interior Wet Areas: Bathrooms and kitchens; fixtures in wet areas include plumbing fixtures, countertops, cabinets, and other similar items.

2.02 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.03 NONSAG JOINT SEALANTS

- A. Type [] - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 - 1. Color: White.
- C. Polymer Sealant: ASTM C920; single component, cured sealant is paintable and mold/mildew resistant, low odor and VOC, and ultraviolet (UV) resistant.
 - 1. Color: White.
- D. Type [] - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 12.5 percent, minimum.
- E. Non-Curing Butyl Sealant: Solvent-based, single component, non-sag, non-skinning, non-hardening, non-bleeding; non-vapor-permeable; intended for fully concealed applications.

2.04 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

.04 POST OC PA

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

END OF SECTION

**SECTION 08 0671
DOOR HARDWARE SCHEDULE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preliminary schedule of door hardware sets for swinging as indicated on drawings.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware: Requirements to comply with in coordination with this section.

1.03 REFERENCE STANDARDS

- A. BHMA A156.3 - American National Standard for Exit Devices 2014.
- B. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks 2014.
- C. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000 2017.
- D. BHMA A156.18 - American National Standard for Materials and Finishes 2016.
- E. DHI (H&S) - Sequence and Format for the Hardware Schedule 1996.

1.04 PROJECT INFORMATION

- A. Project Name: Hatchery House Specifications.
 - 1. Location: 333 Airport RD, Lewistown MT, 59457.
- B. Architect: Spark Architecture.
 - 1. Location: 410 Central, suite 506, Great Falls MT.
 - 2. Phone Number: (406) 453-0001.
- C. Contractor: To Be Determined.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Comply with submittal requirements as indicated in Section 08 7100.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Only manufacturers listed in Door Hardware Schedule or Section 08 7100 are considered acceptable, unless noted otherwise.
- B. Obtain each type of door hardware as indicated from a single manufacturer and single supplier.
- C. Manufacturer's Abbreviations: Coordinate with manufacturers listed in Section 08 7100.
 - 1. BAS - Best Access Systems.
 - 2. CR - Corbin Russwin.
 - 3. CUR - Curries.
 - 4. IVE - Ives.
 - 5. LCN - LCN.
 - 6. McK - McKinney.
 - 7. NOR - Norton.
 - 8. PEM - Pemko.
 - 9. ROC - Rockwood.
 - 10. SA - Sargent.
 - 11. SCH - Schlage.
 - 12. VD - Von Duprin.
 - 13. YA - Yale.

2.02 DESCRIPTION

- A. Door hardware sets provided represent the design intent, they are only a guideline and should not be considered a detailed or complete hardware schedule.
 - 1. Provide door hardware item(s) as required for similar purposes, even when item is not listed for a door in Door Hardware Schedule.

2. Necessary items that are not included in a Hardware Set should be added and have the appropriate additional hardware as required for proper application and functionality.
3. Door hardware supplier is responsible for providing proper size and hand of door for products required in accordance with Door Hardware Schedule and as indicated on drawings.
4. Quantities listed are for each Pair (PR) of doors, or for each Single (SGL) door, as indicated in hardware sets.

2.03 LOCK FUNCTION CODES

- A. Function Codes for Cylindrical Locks: Complying with BHMA A156.5.
- B. Function Codes for Mortise Locks: Complying with BHMA A156.13.
 1. Code F01; Passage/Closet Latchset: Latch bolt by knobs at all times.
 2. Code F02; Privacy Lock: Latch bolt by knobs, deadbolt by turn inside or emergency key outside.
 3. Code F08; Front Door Lock: Latch bolt is operated by knob from either side except when outside knob is made inoperative by a stop or mechanical means other than key. Deadbolt is operated by turn inside. Key outside operates both locks.
 4. Code F19; Privacy, Bedroom, or Bath Lock: Latch bolt by knobs. Deadbolt by turn from inside and emergency key outside. Rotating inside retracts both bolts.

2.04 FINISHES

- A. Finishes: Complying with BHMA A156.18.
 1. Code 626: Satin Nickel plated over nickel, with brass or bronze base material (former US equivalent US26D).

PART 3 EXECUTION

END OF SECTION

**SECTION 08 1416
FLUSH WOOD DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush and flush glazed configuration; non-rated.

1.02 RELATED REQUIREMENTS

- A. Section 06 2000 - Finish Carpentry: Wood door frames.
- B. Section 08 7100 - Door Hardware.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014, with Errata (2018).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1 2017, with Errata (2019).
- C. NEMA LD 3 - High-Pressure Decorative Laminates 2005.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for 2 years.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:
- B. High Pressure Decorative Laminate (HPDL) Faced Doors:
 - 1. VT Industries, Inc; [____]: www.vtindustries.com/#sle.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS AND PANELS

- A. Doors: See drawings for locations and additional requirements.
 - 1. Quality Standard: Premium Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
 - 2. High Pressure Decorative Laminate (HPDL) Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 - 1. Interior doors to be hollow core
 - a. High pressure decorative laminate (HPDL) finish submit manufacturer's sample.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
- B. Hollow Core Doors: Type - Standard (FSHC); plies and faces as indicated above.

2.04 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: Red oak, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
- B. High Pressure Decorative Laminate (HPDL) Facing for Non-Fire-Rated Doors: NEMA LD 3, HGS; color as selected; finish as selected.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- E. Provide edge clearances in accordance with the quality standard specified.

2.06 FINISHES - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
- B. Factory finish doors in accordance with approved sample.

2.07 ACCESSORIES

- A. Wood Door Frames: See Section 06 2000.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

3.05 SCHEDULE

- A. See Door and Frame Schedule appended to in the drawings.

END OF SECTION

**SECTION 08 1423
CLAD WOOD DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clad wood doors with integral frames.

1.02 RELATED REQUIREMENTS

- A. Section 07 2500 - Weather Barriers: Perimeter air and vapor seal between clad wood door frame and adjacent construction.
- B. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- C. Section 08 7100 - Door Hardware.
- D. Section 08 8000 - Glazing.
- E. Section 09 9123 - Interior Painting: Field finishing of doors.

1.03 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights 2017.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2014 (2015 Errata).
- C. ASTM C1036 - Standard Specification for Flat Glass 2016.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- E. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2004 (Reapproved 2012).
- F. NFRC 100 - Procedure for Determining Fenestration Product U-factors 2017.
- G. WDMA I.S. 4 - Industry Specification for Preservative Treatment for Millwork 2015a.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- D. Performance Validation: Submit certified label or test report on products as indicated under performance requirements to validate product compliance.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging [_____]. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Doors with Exterior Aluminum Cladding and Interior Wood Facing:
 - 1. Andersen Windows, Inc; Commercial Entry Doors: www.andersenwindows.com/#sle.
 - 2. Pella Corp; [____]: www.pellacommercial.com/#sle.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COMPONENTS

- A. Clad Wood Doors: See drawings for locations and additional requirements.
- B. Exterior Clad Wood Doors: Water-repellent and preservative-treated lumber in accordance with WDMA I.S. 4.
 - 1. Thickness: 1-3/4 inches, unless otherwise indicated.
 - 2. Exterior Door Cladding: Aluminum sheet as indicated.
 - 3. Exterior Frame Cladding: Extruded aluminum as indicated.
- C. Configuration: As indicated on drawings.
- D. Glazing: Double glazed, clear, high performance Low-E coated, manufacturer's standard gas filled, fully tempered, with glass thicknesses as recommended by manufacturer for specified wind conditions.
 - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3 (architectural).
 - 2. Fully Tempered Glass: ASTM C1048, Kind FT - Fully Tempered.
 - 3. High Performance Low-E Coating: Magnetron sputtering vapor deposition (MSVD) titanium dioxide (TiO₂) coating, applied to No. 2 surface.
- E. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.
 - 1. Apply silicone glazing sealant to exterior glazing stops as recommended by manufacturer.
 - 2. Apply water repellent treatment to wood glazing stops.
- F. Door Stops: Clear preservative treated wood, finished to match frame.
- G. Door Sill: Extruded 6063-T5 aluminum, 1/2 inch low profile threshold with compressible bulb weatherstripping and attached to frame jambs.
 - 1. Color: Mill finish.
- H. Hinges: Heavy duty ball bearing type, 4-1/2 inch, with non-removable pin and set screw.
 - 1. Finish: Satin stainless steel.
- I. Door Hardware: As specified in Section 08 7100.

2.03 DOOR INTERIOR WOOD FACINGS

- A. Veneer Facing for Transparent Finish: Red Oak, veneer grade in accordance with requirements indicated, and plain sliced (flat cut), with book match between leaves of veneer, and running match of spliced veneer leaves assembled on door or panel face.
- B. Door Edging: Any option allowed by quality standard for grade.
- C. Wood Finish: Factory applied primer and field applied opaque finish.
 - 1. Field finish doors as specified in Section 09 9123.
- D. Facing Adhesive: Type I - waterproof.

2.04 DOOR EXTERIOR CLADDING

- A. Aluminum Cladding: 6063-T5 aluminum cladding on exterior side, 0.045 inch minimum thickness, factory fabricated, factory glazed; complete with integral sloped sill/threshold, flashings, and anchorage devices.
- B. Exterior Aluminum Finish: Class II color anodized.
 - 1. Color: Color as selected by Architect from manufacturer's standard colors.
- C. Exterior Wood Frame Aluminum Cover: Extruded 6063-T5 aluminum, color to match door aluminum cladding.
- D. Aluminum Members: Factory finished; solid corner construction; thermally broken.
- E. Drainage: Provide drainage to exterior for moisture entering joints and glazing spaces and for condensation occurring within frame construction.

F. Glass Stops: Same material and color as frame, sloped for wash.

2.05 PERFORMANCE REQUIREMENTS

- A. Comply with AAMA/WDMA/CSA 101/I.S.2/A440 requirements in accordance with the following:
 - 1. Performance Class (PC): R.
- B. Performance Validation: Side hinged doors (SHD) in compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance requirements as indicated, or an independent test report for indicated products itemizing compliance and acceptable by authorities having jurisdiction.
- C. Air Leakage: Maximum of 0.30 cu ft/minute/sq ft at 1.57 psf differential pressure, when tested in accordance with ASTM E283.
- D. Thermal Transmittance: U-factor of 0.35, maximum, that includes window glazing, door and frame system based on average window size required for project and determined in accordance with NFRC 100.

2.06 FABRICATION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- E. Cut and configure exterior door edge to receive recessed weatherstripping devices.
- F. Provide edge clearances in accordance with the quality standard specified.

2.07 FACTORY FINISHING - WOOD VENEER INTERIOR FACE

- A. Factory finish doors in accordance with approved sample.

2.08 FINISHES

- A. Class II Color Anodized Finish: AAMA 611 AA-M12C22A32 integrally colored anodic coating not less than 0.4 mils thick.
- B. Color: To be selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Assemble multiple units before installation in accordance with manufacturer's installation guidelines.
- C. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- D. Field-Finished Doors: Trimming to fit is acceptable.
 - 1. Adjust width of doors by cutting equally on both jamb edges.
 - 2. Trim maximum of 3/4 inch off bottom edges.
- E. Use machine tools to cut or drill for hardware.
- F. Coordinate installation of doors with installation of integral frames and hardware.
- G. Coordinate installation of glazing.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.