DIVISION 06
WOOD, PLASTICS, AND COMPOSITES

SECTION 06 10 53
MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Provide and install miscellaneous rough carpentry as shown on the Contract Drawings and as specified herein.

B. Section Includes:
1. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.
3. Wood blocking, cants, and nailers.
4. Wood furring and grounds.
5. Wood sleepers.
6. Interior wood trim
7. Utility shelving.
8. Plywood backing panels.

C. Related Sections
1. Section 06 16 00 – Sheathing.

1.2 REFERENCES

A. American Society of Mechanical Engineers (ASME) standards, most recent editions:

ASME B18.2.1	Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)
ASME B18.6.1	Wood Screws (Inch Series)

B. ASTM International (ASTM) standards, most recent editions:

ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A563	Standard Specification for Carbon and Alloy Steel Nuts
ASTM A653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM A666	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
ASTM C954	Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
ASTM D3498	Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
ASTM D5664	Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber
ASTM F1667	Standard Specification for Driven Fasteners: Nails, Spikes, and Staples

C. American Wood Council (AWC) standards, most recent editions:

Details for Conventional Wood Frame Construction

National Design Specification (NDS) for Wood Construction with Commentary

D. American Wood Protection Association (AWPA) standards, most recent editions:

AWPA U1	Use Category System: User Specification for Treated Wood
AWPA M4	Standard for the Care of Preservative-Treated Wood Products

E. International Code Council

IBC	International Building Code, current for the Project per Drawings, General Structural Notes.

F. U.S. Department of Commerce, National Institute of Standards and Technology, (NIST) standards, latest editions:

PS 1	Structural Plywood
PS 20	American Softwood Lumber Standard (ASLS)

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. ALSC: American Lumber Standard Committee.
2. WCLIB: West Coast Lumber Inspection Bureau.
3. WWPA: Western Wood Products Association.

C. ICC-ESR: International Code Council Evaluation Service Report.

D. S4S: Surfaced four sides.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 20 – Contractor Submittals.

B. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

C. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

D. Research/Evaluation Reports: ICC-ESR reports for the following, showing compliance with building code in effect for Project:
1. Wood preservative treated wood.
2. Fire retardant treated wood.
3. Power driven fasteners.
4. Powder actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 25 10 - Products, Materials, Equipment and Substitutions.

B. Stack and store lumber products flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

C. Deliver interior wood materials that are to be exposed to view only after building is enclosed and weatherproofed, wet work other than painting is dry, and HVAC systems are operating and maintaining temperature and humidity at occupancy levels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
   1. Metal Framing Anchors:
      a. Simpson Strong-Tie Co., Inc.
      b. Engineer approved equal

2.2 WOOD PRODUCTS, GENERAL

A. Lumber: Document PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

B. Factory mark each piece of lumber with grade stamp of grading agency.

C. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.

D. Where nominal sizes are indicated, provide actual sizes required by document PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.

E. Provide dressed lumber, S4S, unless otherwise indicated.

2.3 WOOD PRESERVATIVE TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1, Use Category 2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA U1, Use Category 1 with inorganic boron (SBX).

B. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

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

D. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

E. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
   1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

F. Application: Treat items indicated on Drawings, and the following:
   1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   3. Wood floor plates that are installed over concrete slabs-on-grade.

2.4 FIRE RETARDANT TREATED MATERIALS

A. General: Comply with performance requirements in AWPA U1, Use Category UCFA (Interior) and UCFB (exterior).

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

C. Use Exterior type for exterior locations and where otherwise indicated.

D. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where otherwise indicated.

E. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
   1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
   2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat items indicated on Drawings, and the following:
   1. Framing for raised platforms.
   2. Concealed blocking.
   3. Roof construction.
   4. Plywood backing panels.

2.5 DIMENSIONAL LUMBER FRAMING

A. Maximum Moisture Content: 19 percent.

B. Wall Studs: Stud or No. 2 grade, Douglas Fir – Larch, WCLIB or WWPA grading rules.

C. Wall Plates: No. 2 or Construction grade, Douglas Fir – Larch, WCLIB or WWPA grading rules.

D. Framing Other Than Noted Above: No. 2 grade or better, Douglas Fir – Larch, WCLIB or WWPA grading rules.

E. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
   1. Species: As indicated above for load-bearing construction of same type.
   2. Grade: No. 1.

2.6 SHEATHING

A. Refer to Section 06 16 00 – Sheathing.

2.7 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
   1. Blocking.
   2. Nailers.
   3. Cants.
   4. Furring.
   5. Utility shelving.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber, Douglas Fir – Larch, 19 percent maximum moisture content.

C. For exposed and concealed boards, provide lumber with 19 percent maximum moisture content, Spruce Pine Fir species, Construction or No. 2 Common grade, WCLIB or WWPA grading rules.

D. For blocking not used for attachment of other construction, provide lumber with 19 percent maximum moisture content, Douglas Fir – Larch species, Utility, Stud, or No. 3 grade, WCLIB or WWPA grading rules. Select pieces and cut to eliminate defects that will interfere with attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.8 INTERIOR WOOD TRIM

A. General: Provide kiln-dried finish (surfaced) material without finger jointing, unless otherwise indicated on Drawings.

B. Softwood Lumber Trim for Transparent (Stain or Clear) Finish: Provide Grade Superior or C & Better finish, Douglas Fir-larch, WCLIB or WWPA grading rules.

C. Hardwood Lumber Trim for Transparent (Stain or Clear) Finish: Clear red oak species, selected for compatible grain and color.

D. Lumber Trim for Opaque (Painted Finish: Solid lumber, Grade 1 Common, Idaho white, lodgepole, ponderosa, or sugar pine species, WWPA grading rules.

E. Moldings: Made to patterns indicated in WMMPA WM7 and graded according to WMMPA WM4.
   1. Moldings for Transparent (Stain or Clear) Finish: N-grade, red oak species, selected for compatible grain and color.
   2. Moldings for Opaque (Painted) Finish P-grade Idaho white, lodgepole, ponderosa, or sugar pine species.

2.9 UTILITY SHELVING

A. Shelving: Made from 3/4-inch melamine-faced particleboard with radiused and filled front edge.

B. Shelf Cleats: 3/4 inch by 3-1/2 inch boards of same species and grade indicated above for lumber trim for opaque finish.

2.10 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: Document PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.11 FASTENERS

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

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: ICC ESR 1539.

D. Wood Screws: ASME B18.6.1.

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

F. Lag Bolts: ASME B18.2.1.

G. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers.

H. Concrete and Masonry Anchors: Refer to Section 05 50 00 – Metal Fabrications.

2.12 METAL FRAMING ANCHORS

A. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings. Design is based on products of Simpson Strong-Tie Co., Inc. Substitutions from other manufacturers must include ICC-ESR evaluation reports with test capacities that equal or exceed those of the Simpson product indicated.

B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653, G60 coating designation.
   1. Use for interior locations where stainless steel is not indicated.

C. Stainless-Steel Sheet: ASTM A666, Type 304.
   1. Use for exterior locations and where specifically indicated.

2.13 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

B. Flexible Flashing Separator Between Preservative-Treated Wood and Metal Decking: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than 0.025 inch.

C. Adhesives for Gluing Wood to Wood, Concrete, or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

D. Water-Repellent Preservative for Ends of Exposed Posts and Beams: NWWDA-tested and accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

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

C. Framing Standard: Comply with AWC's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.

E. Do not splice structural members between supports, unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
   1. Provide metal clips for fastening plywood, gypsum board, or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches on center.
   2. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated on Drawings and as follows:
      a. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches on center with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
      b. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches on center. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- thickness.
      c. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
      d. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet on center.

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

H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
   1. Use inorganic boron for items that are continuously protected from liquid water.
   2. Use copper naphthenate for items not continuously protected from liquid water.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. ICC-ESR 1539 for power-driven fasteners.
   2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

J. Use sinker or common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

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

3.2 WOOD BLOCKING AND NAILER INSTALLATION

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

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 WOOD FURRING INSTALLATION

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

B. Furring to Receive Plywood or Hardboard Paneling: Unless indicated otherwise on Drawings, install 1-by-3-inch nominal size furring horizontally or vertically as applicable, at 24 inches on center.

C. Furring to Receive Gypsum Board: Unless indicated otherwise on Drawings, install 1-by-2-inch nominal size furring vertically at 16 inches on center.

3.4 WOOD TRIM INSTALLATION

A. Install with minimum number of joints practical, using full length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long except where absolutely necessary. Stagger joints in adjacent and related standing and running trim. Cope at interior returns and miter at exterior corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.
   1. Match color and grain pattern across joints for clear and stained finish.
   2. Install trim after wall sheathing operations are completed.
   3. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads and fill holes.
   4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.

3.5 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 06 16 00
SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Provide and install wood sheathing panels as shown on the Contract Drawings and as specified herein.

B. Section Includes:
1. Wall sheathing.
2. Roof Sheathing.
3. Composite nail base insulated roof sheathing.
4. Subflooring.
5. Underlayment.
6. Building paper.
7. Building wrap.
8. Flexible flashing at openings in sheathing.

1.2 REFERENCES

A. American Hardboard Association (AHA) standards, most recent editions:

A135.4	Basic Hardboard
Application Instructions for Basic Hardboard Products	

B. American Society of Mechanical Engineers (ASME) standards, most recent editions:

ASME B18.6.1	Wood Screws (Inch Series)

C. ASTM International (ASTM) standards, most recent editions:

ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM C79	Standard Specification for Gypsum Sheathing Board
ASTM C208	Standard Specification for Cellulosic Fiber Insulating Board
ASTM C578	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C846	Standard Practice for Application of Cellulosic Fiber Insulating Board for Wall Sheathing

ASTM C954	Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
ASTM C1002	Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
ASTM C1289	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM C1396	Standard Specification for Gypsum Board
ASTM D226	Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D3498	Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
ASTM D5664	Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber
ASTM E1677	Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls
ASTM F1667	Standard Specification for Driven Fasteners: Nails, Spikes, and Staples

D. American Wood Protection Association (AWPA) standards, most recent editions:

AWPA U1	Use Category System: User Specification for Treated Wood

E. International Code Council:

IBC	International Building Code, current for the Project per Drawings, General Structural Notes.

F. Underwriters Laboratories (UL) standards, most recent editions:

Fire Resistance Directory

G. U.S. Department of Commerce, National Institute of Standards and Technology, (NIST) standards, latest editions:

PS 1	Structural Plywood
PS 2	Performance Standard for Wood-Based Structural-Use Panels

1.3 DEFINITIONS

A. ICC-ESR: International Code Council Evaluation Service Report.

B. S1S: Surfaced 1 side.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 20 – Contractor Submittals.

B. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
   2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
   3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.
   4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
   5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
   6. For building wrap, include data on air/moisture infiltration protection based on testing according to referenced standards.

C. Research/Evaluation Reports: ICC-ESR reports for the following, showing compliance with building code in effect for Project:
   1. Preservative treated plywood.
   2. Fire retardant treated plywood.
   3. Foam plastic sheathing
   4. Building wrap.

1.5 QUALITY ASSURANCE

A. Fire Test Response Characteristics: For assemblies with fire resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to Engineer
   1. Fire Resistance Ratings: Indicate by design designations from UL's "Fire Resistance Directory.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 25 10 - Products, Materials, Equipment and Substitutions.

B. Stack and store plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
   1. Paper Surfaced Gypsum Wall Sheathing:
      a. G-P Gypsum Corporation.
      b. National Gypsum Corporation.
      c. United States Gypsum Company.
      d. Engineer approved equal.
   2. Extruded Polystyrene Foam Wall Sheathing:
      a. DiversiFoam Products
      b. Dow Chemical Company.
      c. Owens Corning.
      d. Engineer approved equal.
   3. Foil-Faced, Polyisocyanurate Foam Wall Sheathing:
      a. Apache Products Company.
      b. Dow Chemical Company.
      c. Johns Manville; Berkshire Hathaway Inc.
      d. Rmax, Inc.
      e. Engineer approved equal.
   4. Oriented Strand Board Surfaced, Polyisocyanurate-Foam Sheathing:
      a. Atlas Roofing Corporation.
      b. Dow Chemical Company.
      c. Johns Manville; Berkshire Hathaway, Inc.
      d. Rmax, Inc.
      e. Engineer approved equal.
   5. Building Wrap:
      a. Dow Chemical Company; Styrofoam Weathermate Plus Brand Housewrap.
      b. DuPont; Tyvek Commercial Wrap.
      c. Raven Industries Inc.; Rufco-Wrap.
      d. Engineer approved equal

2.2 WOOD PANEL PRODUCTS, GENERAL

A. Plywood: Either document PS 1 or document PS 2, unless otherwise indicated.

B. Oriented Strand Board: Document PS 2.

C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated on the Drawings.

D. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE TREATED PLYWOOOD

A. Preservative Treatment by Pressure Process: AWPA U1, Use Category UC2.

B. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

C. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

D. Select first option in paragraph below and delete others if total treatment is required; otherwise, select second option with or without third option.

E. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete.

2.4 FIRE RETARDANT TREATED PLYWOOD

A. General: Comply with performance requirements in AWPA U1, Use Category UCFB.
   1. Use treatment that does not promote corrosion of metal fasteners.
   2. Use Exterior type for exterior locations and where indicated.
   3. Use Interior Type A, High Temperature (HT) for roof sheathing and where indicated.

B. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Identify fire retardant treated plywood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to Engineer.

D. Application: Treat plywood indicated on Drawings, and the following:
   1. Roof and wall sheathing within 48 inches of fire or party walls.
   2. Subflooring and underlayment for raised platforms.

2.5 WALL SHEATHING

A. Plywood Wall Sheathing: Exposure 1, Structural I.
   1. Span Rating: Not less than 32/16 unless noted otherwise on Drawings.
   2. Nominal Thickness: Not less than 7/16 inch unless noted otherwise on Drawings.

B. Oriented Strand Board Wall Sheathing: Exposure 1, Structural I.
   1. Span Rating: Not less than 32/16 unless noted otherwise on Drawings.
   2. Nominal Thickness: Not less than 7/16” unless noted otherwise on Drawings.

C. Paper-Surfaced Gypsum Wall Sheathing: ASTM C79 or ASTM C1396, gypsum sheathing; with water-resistant-treated core and with water-repellent paper bonded to core's face, back, and long edges.
   1. Type and Thickness: Type X, 5/8 inch thick.
   2. Edge and End Configuration: Square.
   3. Size: 48 by 96 inches for vertical installation.

D. Fiberboard Wall Sheathing: ASTM C 208, Type IV, Grade [1 (Regular)] [2 (Structural)] cellulosic fiberboard sheathing with square edges, 1/2 inch thick.

E. Extruded Polystyrene Foam Wall Sheathing: ASTM C 578, Type IV, in manufacturer's standard lengths and widths with tongue-and-groove or shiplap long edges as standard with manufacturer.
   1. Thickness: As indicated on Drawings.

F. Foil-Faced, Polyisocyanurate Foam Wall Sheathing: ASTM C1289, Type I, Class 2, aluminum foil faced, glass-fiber-reinforced, rigid, cellular, Polyisocyanurate thermal insulation. Foam plastic core and facings shall have a flame spread index of 25 or less when tested individually.
   1. Thickness: As indicated on Drawings.

2.6 ROOF SHEATHING

A. Plywood Roof Sheathing: Exposure 1, Structural I.
   1. Span Rating: As required to suit joist or truss spacing indicated on Drawings.
   2. Nominal Thickness: Not less than 19/32 inch unless noted otherwise on Drawings.

B. Oriented-Strand-Board Roof Sheathing: Exposure 1, Structural I .
   1. Span Rating: As required to suit joist or truss spacing indicated on Drawings.
   2. Nominal Thickness: Not less than 19/32inch unless noted otherwise on Drawings.

2.7 COMPOSITE NAIL BASE INSULATED ROOF SHEATHING

A. Oriented Strand Board Surfaced, Polyisocyanurate Foam Sheathing: Rigid, cellular, Polyisocyanurate thermal insulation with oriented strand board laminated to one face complying with ASTM C1289, Type V, Grade 2.
   1. Polyisocyanurate-Foam Thickness: 4 inches.
   2. Oriented-Strand-Board Nominal Thickness: 7/16 inch.

B. Vented, Oriented Strand Board Surfaced, Polyisocyanurate Foam Sheathing: Rigid, cellular, polyisocyanurate thermal insulation complying with ASTM C1289, Type V, Grade 2, with oriented strand board adhered to spacers on one face.
   1. Polyisocyanurate-Foam Thickness: 4 inches.
   2. Oriented Strand Board Nominal Thickness: 7/16 inch.
   3. Spacers: Blocks not less than 1-1/2 inch thick and spaced not more than 16 inches on center.

2.8 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
   1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: ICC ESR 1539.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
   1. For wall and roof sheathing panels, provide screws with organic polymer or other corrosion protective coating having a salt spray resistance of more than 800 hours according to ASTM B117.

F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic polymer or other corrosion protective coating having a salt spray resistance of more than 800 hours according to ASTM B117.
   1. For steel framing less than 0.0329 inch thick, attach sheathing to comply with ASTM C1002.
   2. For steel framing from 0.033 to 0.112 inch thick, attach sheathing to comply with ASTM C954.

G. Screws for Fastening Oriented Strand Board Surfaced, Polyisocyanurate Foam Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117. Provide washers or plates if recommended by sheathing/insulation manufacturer.

2.9 MISCELLANEOUS MATERIAL

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with ASTM D3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.
   1. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:
   1. ICC ESR 1539 for power-driven fasteners.

2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

D. Use sinker or common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

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

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

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

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. Fastening Methods: Fasten panels as indicated below:
   1. Combination Subfloor-Underlayment:
      a. Glue and nail to wood framing.
      b. Screw to cold-formed metal framing.
      c. Space panels 1/8 inch apart at edges and ends.
   2. Subflooring:
      a. Glue and nail to wood framing.
      b. Screw to cold-formed metal framing.
      c. Space panels 1/8 inch apart at edges and ends.
   3. Wall and Roof Sheathing:
      a. Nail to wood framing.
      b. Screw to cold-formed metal framing.
      c. Space panels 1/8 inch apart at edges and ends.
   4. Underlayment:
      a. Nail to subflooring.
      b. Space panels 1/32 inch apart at edges and ends.
      c. Fill and sand edge joints of underlayment receiving resilient flooring right before installing flooring.

3.3 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.
   1. Fasten gypsum sheathing to wood framing with screws.
   2. Fasten gypsum sheathing to cold-formed metal framing with screws.
   3. Install boards with a 3/8-inch gap where non load-bearing construction abuts structural elements.
   4. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.

C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.

D. Space fasteners approximately 8 inches on center and set back a minimum of 3/8 inch from edges and ends of boards.

3.4 FIBERBOARD SHEATHING INSTALLATION

A. Comply with ASTM C846 and with manufacturer's written instructions.

B. Fasten fiberboard sheathing panels to intermediate supports and then at edges and ends. Use galvanized roofing nails or galvanized staples; comply with manufacturer's recommended spacing and referenced fastening schedule. Drive fasteners flush with surface of sheathing and locate perimeter fasteners at least 3/8 inch from edges and ends.

C. Install sheathing vertically with long edges parallel to, and centered over, studs. Install solid wood blocking where end joints do not occur over framing. Allow 1/8-inch open space between edges and ends of adjacent units. Stagger horizontal joints if any.

D. Cover sheathing as soon as practical after installation to prevent deterioration from wetting.

3.5 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.
   1. Prime substrates as recommended by flashing manufacturer.
   2. Lap seams and junctures with other materials at least 4 inches, except that at flashing flanges of other construction, laps need not exceed flange width.
   3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
   4. Lap weather-resistant building paper over flashing at heads of openings.
   5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION

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SECTION 06 20 23
INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior trim.
2. Interior plywood.
3. Shelving.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
2. Section 061053 "Miscellaneous Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
3. Section 099123 "Interior Painting" for priming and backpriming of interior finish carpentry.

1.3 DEFINITIONS

A. MDF: Medium-density fiberboard.

B. MDO: Plywood with a medium-density overlay on the face.

C. PVC: Polyvinyl chloride.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative

retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.

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

B. Samples: For each exposed product and for each color and texture specified.

C. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.

D. Samples for Verification:

1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished; 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.
2. For foam-plastic moldings, with half of exposed surface finished; 50 sq. in. (300 sq. cm).
3. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.

1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
2. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.

B. Softwood Plywood: DOC PS 1.

C. Hardboard: ANSI A135.4.

D. MDF: ANSI A208.2, Grade 130.

E. Particleboard: ANSI A208.1, Grade M-2.

F. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

1. Color: White

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC1.

1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent, respectively.
2. Preservative Chemicals: Acceptable to authorities having jurisdiction.
3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
4. Do not use material that is warped or does not comply with requirements for untreated material.
5. Mark lumber with treatment-quality mark of an inspection agency approved by the ALSC's Board of Review.

a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

6. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

    a. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.

2.3 INTERIOR TRIM

A. Softwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: Eastern white pine; NeLMA or NLGA C Select.
2. Species and Grade: Idaho white, lodgepole, ponderosa, radiata, or sugar pine; NLGA or WWPA C Select (Choice).
3. Species and Grade: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; NeLMA, NLGA, or WWPA C Select (Choice).
4. Species and Grade: White woods; WWPA C Select.
5. Species and Grade: Douglas fir-larch or Douglas fir south; NLGA, WCLIB, or WWPA Superior or C & Btr finish.
6. Species and Grade: Southern pine; SPIB B & B finish.
7. Species and Grade: Western red cedar; NLGA, WCLIB, or WWPA Clear Heart.
8. Maximum Moisture Content: 19 percent.
9. Finger Jointing: Allowed.
10. Face Surface: Surfaced (smooth).

B. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: Red oak.
2. Maximum Moisture Content: 13 percent.
3. Finger Jointing: Not allowed.
4. Gluing for Width: Allowed.
5. Veneered Material: Not allowed.
6. Face Surface: Surfaced (smooth).
7. Matching: Selected for compatible grain and color.

2.4 SHELVING

A. Utility Shelving: Made from one of the following materials, 3/4 inch (19 mm) thick: (coord. Materials w/ owner).

1. Particleboard with solid-wood front edge.
2. MDF with solid-wood front edge.
3. MDO softwood plywood with solid-wood edge.
4. Melamine-faced particleboard with applied-PVC front edge.
5. Wood boards as specified above for lumber trim for opaque finish.
6. Softwood Boards: Kiln-dried eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; NeLMA, NLGA, or WWPA C Select (Choice).
7. Softwood Boards: Kiln-dried Douglas fir-larch, Douglas fir south, or hem-fir; SPIB Superior or C & Btr finish; NLGA, WCLIB, or WWPA; or southern pine; B & B finish.

B. Shelf Cleats: 3/4-by-3-1/2-inch (19-by-89-mm) boards as specified above for shelving.

C. Standards for Adjustable Shelf Brackets: BHMA A156.9, B04102; powder-coat-finished steel.

D. Adjustable Shelf Brackets: BHMA A156.9, B04112; powder-coat-finished steel.

E. Standards for Adjustable Shelf Supports: BHMA A156.9, B04071; powder-coat-finished steel.

F. Adjustable Shelf Supports: BHMA A156.9, B04081 or B04091; powder-coat-finished steel.

2.5 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

B. Low-Emitting Materials: Adhesives shall comply with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.6 FABRICATION

A. Back out or kerf backs of the following members, except those with ends exposed in finished work:

1. Interior standing and running trim, except shoe and crown molds.
2. Wood-board paneling.

B. Ease edges of lumber less than 1 inch (25 mm) in nominal thickness to 1/16-inch (1.5-mm) radius and edges of lumber 1 inch (25 mm) or more in nominal thickness to 1/8-inch (3-mm) radius.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

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

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.

1. Use concealed shims where necessary for alignment.
2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
4. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.
5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.

1. Do not use pieces less than 24 inches (610 mm) long, except where necessary.
2. Stagger joints in adjacent and related standing and running trim.
3. **Cope** at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
4. Use scarf joints for end-to-end joints.
5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
7. Install trim after gypsum-board joint finishing operations are completed.
8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
9. Fasten to prevent movement or warping.
10. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 SHELVING

A. Cut shelf cleats at ends of shelves about 1/2 inch (13 mm) less than width of shelves and sand exposed ends smooth.

1. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled.
2. Space fasteners not more than 16 inches (400 mm) o.c. Use two fasteners at each framing member or fastener location for cleats 4 inches nominal (89 mm actual) in width and wider.
3. Apply a bead of multipurpose construction adhesive to back of shelf cleats before installing.
4. Remove adhesive that is squeezed out after fastening shelf cleats in place.

B. Install shelf brackets according to manufacturer's written instructions, spaced not more than 32 inches (800 mm) o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.

C. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners not more than 12 inches (300 mm) o.c.

D. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced not more than 36 inches (900 mm) o.c. and within 6 inches (150 mm) of ends of shelves. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.

E. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled.

1. Install shelves, fully seated on cleats, brackets, and supports.
2. Fasten shelves to cleats with finish nails or trim screws, set flush.
3. Fasten shelves to brackets to comply with bracket manufacturer's written instructions.

3.6 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements.

1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

B. Adjust joinery for uniform appearance.

3.7 CLEANING

A. Clean interior finish carpentry on exposed and semi-exposed surfaces.

B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.8 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 06 41 13

WOOD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Wood architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing architectural cabinets that are not concealed within other construction.
3. Shop finishing of architectural cabinets.

B. Related Requirements:

1. Section 06 10 53 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.

1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 08 71 00 "Door Hardware" to manufacturer of architectural cabinets; coordinate Shop Drawings and fabrication with hardware requirements.

1.4 PRE-INSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: For architectural cabinets.

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in architectural cabinets.
5. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples: For each exposed product and for each color and finish specified, in manufacturer's standard size.

D. Samples for Initial Selection: For each type of exposed finish.

E. Samples for Verification: For the following:

1. Lumber for Transparent Finish: Not less than 5 inches (125 mm) wide by 12 inches (300 mm) long for each species and cut, finished on one side and one edge.
2. Veneer Leaves: Representative of and selected from flitches to be used for transparent-finished cabinets.
3. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Certificates: For each type of product.

1. Composite wood and agrifiber products.
2. Glass.
3. Adhesives.

C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

D. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.8 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

B. Installer Qualifications: Licensed participant in AWI's Quality Certification Program.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of typical architectural cabinets as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.

C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at

site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINET MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Huetter Mill and Cabinet Company
2. Granite Mill
3. Advanced Cabinets
4. Artistic Mill
5. Swainston Mill and Cabinets

2.2 CABINETS, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of architectural cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from AWI certification program indicating that woodwork and installation complies with requirements of grades specified.

    a. This project has been registered with AWI as AWI Quality Certification Program Number <Insert number>.

2. The Contract Documents contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

2.3 WOOD CABINETS FOR TRANSPARENT FINISH

A. Architectural Woodwork Standards Grade: Premium.

B. Type of Construction: Face frame.

C. Door and Drawer-Front Style: Flush overlay.

1. Door and Drawer fronts to be fully wrapped with plastic laminate. Color to match Architects approved sample.

D. Wood for Exposed Surfaces: As indicated on Drawings.

1. Species: [**Red oak**] [**White oak**].
2. Blueprint Matching: Comply with veneer and other matching requirements indicated for blueprint-matched paneling.
3. Cut: Plain sliced/plain sawn.
4. Grain Direction: Vertically for doors and fixed panels, horizontally for drawer fronts.
5. Matching of Veneer Leaves: Book match.
6. Veneer Matching within Panel Face: [**Running**] [**Balance**] [**Center-balance**] match.
7. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.

E. Semi-exposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.

2. Drawer Sub-fronts, Backs, and Sides: Solid-hardwood lumber, same species indicated for exposed surfaces
3. Drawer Bottoms: Hardwood plywood.

F. Dust Panels: 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers unless located directly under tops.

G. Drawer Construction: Fabricate with exposed fronts fastened to sub-front with mounting screws from interior of body.

1. Join sub-fronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

2.4 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.
2. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Softwood Plywood: DOC PS 1[**, medium-density overlay**].
2. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
3. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.5 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087100 "Door Hardware."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, self-closing.

C. Wire Pulls: Back mounted, solid metal, 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.

D. Catches: Magnetic catches, BHMA A156.9, B03141.

E. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

F. Shelf Rests: BHMA A156.9, B04013; metal.

G. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.

    a. Type: Full extension.
    b. Material: Zinc-plated steel with polymer rollers.

2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel, ball-bearing slides.
3. For drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm) wide, provide Grade 2.
4. For drawers more than 3 inches (75 mm) high, but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.
5. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide Grade 1HD-100.

H. Slides for Sliding Glass Doors: BHMA A156.9, B07063; plastic.

I. Door Locks: BHMA A156.11, E07121.

J. Drawer Locks: BHMA A156.11, E07041.

K. Door and Drawer Silencers: BHMA A156.16, L03011.

L. Float Glass for Cabinet Doors: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

1. Thickness: 3.0 mm.

M. Tempered Float Glass for Cabinet Doors: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3, 6 mm thick unless otherwise indicated.
1. Unframed Glass Doors: Seam exposed edges seamed before tempering.

N. Grommets for Cable Passage: 1-1/4-inch (32-mm) OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Color: Black.

O. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
1. Satin Stainless Steel: BHMA 630.

P. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.6 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.7 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate architectural cabinets to dimensions, profiles, and details indicated. Ease edges and corners to 1/16-inch (1.5-mm) radius unless otherwise indicated.

C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

E. Install glass to comply with applicable requirements in Section 08 80 00 "Glazing" and in GANA's "Glazing Manual."

1. For glass in wood frames, secure glass with removable stops.
2. For exposed glass edges, polish and grind smooth.

2.8 SHOP FINISHING

A. General: Finish architectural cabinets at manufacturer's shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

B. General: Shop finish transparent-finished architectural cabinets at manufacturer's shop as specified in this Section. See Section 09 90 00 "Painting" for field finishing of opaque-finished architectural cabinets.

C. General: Drawings indicate items that are required to be shop finished. Finish these items at manufacturer's shop as specified in this Section. See Section 09 90 00 "Painting" and Section 09 93 00 "Staining and Transparent Finishing" for field finishing of architectural cabinets.

D. Shop Priming: Shop apply the prime coat including back-priming, if any, for transparent-finished items specified to be field finished. See Section 09 90 00 "Painting" and Section 09 93 00 "Staining and Transparent Finishing" for material and application requirements.

E. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural cabinets, as applicable to each unit of work.

1. Back-priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.

F. Transparent Finish:

1. Architectural Woodwork Standards Grade: Premium.
2. Finish: System - Nitrocellulose lacquer.
3. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to cabinets made from closed-grain wood before staining and finishing.
4. Staining: None required.
5. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
6. Sheen: Coordinate w/ owner (gloss units measured on 60-degree gloss meter per ASTM D 523).

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with cabinet surface.

1. For shop-finished items, use filler matching finish of items being installed.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) using concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
3. Maintain veneer sequence matching of cabinets with transparent finish.
4. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood framing, blocking, or hanging strips.

E. Shop Finishes: Touch up finishing after installation of architectural cabinets. Fill nail holes with matching filler.

1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

F. Field Finishing: See Section 099123 "Interior Painting" and Section 099300 "Staining and Transparent Finishing" for finishing of installed architectural cabinets.

3.3 FIELD QUALITY CONTROL

A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.

1. Inspection entity shall prepare and submit report of inspection.

3.4 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semi-exposed surfaces. Touch up finishes to restore damaged or soiled areas.

END OF SECTION

DIVISION 07
THERMAL AND MOISTURE PROTECTION

SECTION 07 13 26
SHEET MEMBRANE WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. The Contractor shall provide sheet membrane waterproofing system and appurtenant Work, complete, and in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

A. General: All submittals shall be in accordance with Section 01 33 20 – Contractor Submittals.

B. Product Data: The Contractor shall submit the manufacturer's product specifications, installation instructions, standard details, and general recommendations applicable to the waterproofing system. Product data shall include descriptions of surface conditioner, flexible flashing, joint cover sheet, and joint and crack sealant, with appropriate temperature range for the application of waterproofing membrane.

C. Certification: The Contractor shall submit the manufacturer's written certification and acceptance of the installer and qualifications, along with documentation of the installer's experience background containing names, addresses, and sizes of projects with dates of completion.

1.3 QUALITY ASSURANCE

A. General: All Work shall be performed in accordance with the National Roofing Contractors Association (NRCA) - Waterproofing Manual.

B. Manufacturer: Obtain primary waterproofing materials of each type required from a single manufacturer to the greatest extent possible. Secondary materials shall be provided only as recommended by the manufacturer of the primary materials.

C. Manufacturer's Qualifications: The sheet membrane waterproofing system shall be the product of a single manufacturer who has been engaged in the successful production of the system herein for a period of not less than five years.

D. Installer's Qualifications: Installation shall be accomplished by an installing firm that is a manufacturer-trained applicator or a firm approved in writing as an installer by the waterproofing system manufacturer. Installer shall have not less than five years successful experience with the indicated system, within the state in which the project is located, and having a background of not less than three installations of comparable size and scope to that herein.

E. Environmental Quality: Compounds and products provided as a part of Work of this Section, shall conform to applicable environmental regulations in effect the Project site at the time of installation, including the following:

F. Maximum content of Volatile Organic Compounds (VOC) shall not exceed 350 grams per liter.

G. Chlorinated primers and surface conditioners shall not be used.

1.4 WARRANTY

A. Contractor shall obtain and furnish a product warranty from the Manufacturer and a maintenance and guarantee bond that the system will resist penetration of water for 5 years from the date of Substantial Completion of the Project, except where such failure is the result of structural failure of the facility. Hairline cracking of concrete due to temperature change or shrinkage will not be considered a structural failure.

B. For repair Work, Contractor shall be responsible for all aspects of removing and replacing failed materials as well as related materials and assemblies, which may be affected by repair Work of sheet membrane waterproofing. Such responsibility shall include protection, removal and replacement of related or connected items such as paving, landscaping, piping and other installed items such that the completed rework is no less than equal to the original Work.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Contractor shall provide sheet-waterproofing products that have been produced and installed to establish and maintain watertight continuous seals. Waterproofing system shall be capable of resisting a water head of not less than 150 feet and preventing moisture migration into the interior.

2.2 MEMBRANE MATERIALS

A. Damp Composite Laminate Membrane: Comprised of a 54 to 56 mil thickness of rubberized asphalt and a 4 to 8 mil thickness of cross-laminated polyethylene; 60 mil total thickness; 36 to 48-inch wide roll; conforming to the following criteria:
   1. When tested for tensile strength, according to the requirements of ANSI/ATSM D 412 - Test Method for Rubber Properties in Tension, material shall have the following properties:
      a. Film Strength: 5000 psi, minimum.
      b. Membrane Strength: 300 psi, minimum.
      c. Elongation Strength: 300% minimum.
   2. When tested for water absorption, according to the requirements of ASTM D 570 - Test Method for Water Absorption of Plastics, material shall absorb no more than 0.10% maximum.
   3. When tested for moisture vapor, according to the requirements of ASTM E 96 - Method B, Test Method for Water Vapor Transmission of Materials, material shall achieve a rating of 0.05 perms.
   4. When tested for low temperature pliability, according to the requirements of ANSI/ASTM D 1970 - Self-Adhering Polymer Modified Bituminous Sheet Materials, material shall be “Unaffected”.

B. Manufacturers: Waterproofing sheet membrane shall be W.R. Grace Bituthene 4000 Waterproofing Membrane; PolyGuard 650 Membrane; W.R. Meadows Mel-rol Waterproofing Membrane; or equal.

C. Seaming Materials: Seaming materials shall be as recommended by membrane manufacturer.

D. Sustainable Design Submittals

2.3 ADHESIVE MATERIALS

A. Surface Conditioner: Latex type, compatible with membrane.

B. Adhesives: As recommended by membrane manufacturer.

C. Thinner and Cleaner: As recommended by the adhesive manufacturer, compatible with sheet membrane.

2.4 ACCESSORIES

A. Sealant: Sealant shall be as recommended by the membrane manufacturer for use with the products and for the substrates to which they are adhered.

B. Drainage Board (Miradrain): Provide three-dimensional high-impact polymeric core and filter fabric. Bonding of the fabric to core dimples fabric shall be bonded to core dimples. Core configuration shall be multi-directional to provide a uniform flow path for water to escape. Dimplex shall be designed so that flanges of panels interlock and overlap without interference with the water flow. The drainage board shall be capable of withstand the back filling (90%) compaction without failing.
   1. Drainage board shall be Microdrain 6200 and 9000 by Nicolon Mirafi Group; Sheet Drain and Dock Drain with protective backing by Greenstreak, Inc.; or equal.

C. Protection Board:
   1. For Vertical Walls: Protection board material shall be 1/4-inch (minimum) thickness, of size and composition as recommended by the membrane manufacturer; W.R. Grace Bituthene-PB protection board; Amoco Amocor-PB6 protection course; or equal.
   2. For Horizontal Surfaces: Protection board material shall be 1/4-inch (minimum) thickness, asphalt impregnated hardboard of size and composition as recommended by the membrane manufacturer.

D. Flashing Materials: Except as otherwise indicated, provide types of flexible sheet material for flashing as recommended by waterproofing sheet manufacturer.

E. Liquid Membrane: Except as otherwise indicated, provide liquid membrane material as recommended by waterproofing sheet manufacturer; W.R. Grace LM-4000 Liquid Membrane; Polyguard 95 Liquid Membrane; W.R. Meadows Mel-Rol liquid membrane; or equal.

F. Mastic: Except as otherwise indicated, provide mastic material as recommended by waterproofing sheet manufacturer; W.R. Grace Elastomeric Mastic - Bituthene EM-4000; Polyguard 650 Mastic; W.R. Meadows Elastomeric Mastic; or approved equal.

PART 3 - EXECUTION

3.1 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken packages or containers bearing the manufacturer's label. Packages or containers shall be delivered to the site with seals unbroken.

B. Storage: All materials shall be carefully stored in an area that is protected from deleterious elements in a manner recommended by the product manufacturer. Storage shall be in a manner that will prevent damage to the system components.

3.2 GENERAL

A. Project Conditions:
   1. Adhesive applied/bonded elastomeric sheet membrane waterproofing, complete with all required accessories, and protection board, shall be provided at all exterior surfaces of below grade walls and roofs of structures, excluding walls (only) of hydraulic structures.
   2. Materials shall not be installed in standing water or during precipitation.
   3. Weather: Waterproofing and associated Work shall proceed only when existing and forecasted weather conditions will permit Work to be performed in accordance with Manufacturers' recommendations and warranty requirements.
   4. Ambient temperatures shall be maintained above 40 degrees F. for no less than 48 hours before and during application and until liquid or mastic accessories have completely cured.

B. Substrate Conditions:
   1. Work shall proceed only after substrate construction, openings, and penetrating Work has been completed.
   2. Concrete surfaces shall have cured a minimum of ten days and be dry.
   3. Concrete masonry surfaces shall have cured a minimum of ten days and be dry.

C. Take precautions within the installed system and in adjacent materials and areas, against improper use of incompatible materials such as solvents, phenols or creosote preservatives or asphaltic based materials. Protective coverings shall be installed to isolate incompatible materials or compatible materials shall be employed throughout.

3.3 INSPECTION

A. The Contractor's installer shall thoroughly examine all substrates on which the sheet membrane waterproofing system will be installed and conditions under which Work will be performed. Installer shall verify that substrate surfaces are durable, free of matter detrimental to adhesion or application of the waterproofing system, and that items which penetrate surfaces, which are to receive waterproofing, are securely installed.

B. Work shall not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.4 PREPARATION

A. Adjacent surfaces, which are not designated to receive waterproofing, shall be protected.

B. Surfaces designated to receive waterproofing shall be cleaned and prepared in accordance with Manufacturer's instructions. Projections, concrete splatter, general surface dirt and other foreign materials shall be removed to leave surfaces in clean condition, suitable for application of the membrane.
   1. Form fins and ridges shall be ground smooth.
   2. Outside corners shall be free of sharp edges.
   3. Surfaces shall be cleaned with high-pressure air to remove dust, loose stones and debris.
   4. Holes and grossly irregular surfaces shall be patched with Portland cement grout, concrete or epoxy grout, or other approved patching material.

C. Cracks and joints shall be sealed with sealant materials using depth-to-width ratio as recommended by the sealant manufacturer.

D. Contractor shall apply sheet membrane waterproofing to all below-grade exterior surfaces of walls and roof slabs where it is possible that such surfaces might be required to resist a head of water pressure buildup either through horizontal ponding or vertical accumulation. This requirement shall specifically apply to occupiable spaces where leakage resistance is critical, and where interior wall surfaces are visible, such as below grade rooms, and exit stair vestibules. This requirement shall also specifically apply to visible exterior wall surfaces such as retaining walls.

3.5 INSTALLATION – SELF-ADHERED MEMBRANE SYSTEM

A. General: Sheet membrane waterproofing system shall be installed in accordance with the manufacturer's instructions.

B. Release paper layer shall be removed. Membrane shall be rolled out onto the substrate with a mechanical roller to encourage full contact bond.

C. Edges and ends shall be overlapped and sealed by contact tape or contact adhesive a minimum of 3 inches. Laps shall be sealed permanently waterproof.

D. Joints: Joint filler shall be installed as recommended by the manufacturer, with a protruding, rounded surface. A continuous 8-inch wide strip of membrane shall be applied over the joint, followed by membrane application. Membrane shall typically be reinforced with multiple thickness of membrane material over static or moving joints.

E. Top Edge Seal: Membrane applied to vertical and sloped walls shall terminate in reglet; otherwise, it shall terminate under flashing or under masonry in joint. Exposed edges shall be caulked with mastic or sealant. Sheet membrane waterproofing shall extend up vertical surfaces a minimum of 2-inches above finish grade unless otherwise indicated.

F. Corners:

1. Outside Corners: Double cover outside corners with initial strip of sheet membrane, 12-inches minimum width, centered on axis of corner. Completely cover membrane strip by regular application of sheet membrane.
2. Inside Corners: Form fillet with liquid membrane; extend minimum 90 mil thickness, 6-inches vertically and 6-inches horizontally. Completely cover liquid membrane strip by regular application of sheet membrane.
3. Membrane laps and seams that occur within 12-inches of corners shall be thoroughly covered with troweled mastic.

G. Joints on vertical and/or sloped substrate shall be weatherlapped and sidelapped in the direction of drainage. Joints and seams shall be sealed.

H. Flexible flashing shall be installed and sealed watertight to the membrane.

I. Flashing shall be sealed to adjoining surfaces.

J. Items penetrating the membrane shall be sealed and counter flashing membrane material shall be installed.

3.6 CLEANING

A. Provide protection of the completed sheet membrane system during installation of other materials or processes over membrane and throughout the remainder of the construction period.

B. Traffic shall not be permitted over unprotected or uncovered membrane.

C. Membrane shall be protected from damage by providing a protection board or drainage board over the membrane surface. Protection board shall be provided wherever drainage board is not indicated. Boards shall be scribed and cut around projections and interruptions. Drainage boards shall be connected to drainage system.

END OF SECTION

SECTION 07 14 00
FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Provide and apply single-component, fluid-applied liquid waterproofing system to below grade concrete slabs, walls, and footings, including surface preparation.

1.2 RELATED SECTIONS

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

B. Section 04 22 00 Concrete Unit Masonry

C. Section 07 92 00 - Joint Sealants.

1.3 REFERENCES

A. ASTM International (ASTM) standards, most recent editions:

ASTM C836	Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
ASTM D41	Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
ASTM D1644	Standard Test Methods for Nonvolatile Content of Varnishes
ASTM D4263	Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM E96	Standard Test Methods for Water Vapor Transmission of Materials

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 20 – Submittal Procedures.

B. Product Data: For each type of product indicated. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

C. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins to adjoining waterproofing, and other termination conditions which may be required.

D. Qualification Data: For qualified Installer.

E. Product Test Reports: For waterproofing, based on evaluation of comprehensive tests performed by a qualified testing agency.

F. Field quality-control reports.

G. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm that is approved or licensed by manufacturer for installation of waterproofing required for this Project and is eligible to receive special warranties specified.

B. Source Limitations: Obtain waterproofing materials from single source from single manufacturer.

C. Preinstallation Conference: Conduct conference at Project site.
   1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, installation procedures, testing and inspection procedures, and protection and repairs.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 25 10 - Products, Materials, Equipment and Substitutions.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.

C. Remove and replace liquid materials that cannot be applied within their stated shelf life.

D. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, or when temperature is below 0 Degrees F.
   1. Do not apply membrane when air, material, or surface temperatures are expected to fall below 30 Degrees F within four hours of completed application.
   2. Do not apply membrane if rainfall is forecast or imminent within 12 hours.
   3. Do not apply waterproofing membrane to any surfaces containing frost.
   4. Consult manufacturer for applications to green concrete.

B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.8 WARRANTY

A. Special Warranty: The special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents, and shall be in addition to, and run concurrent with, other warranties made under requirements of the Contract Documents.

B. Provide written warranty signed by waterproofing manufacturer and installer agreeing to repair or replace waterproofing that does not meet requirements or that does not remain watertight within the specified warranty period.

C. Warranty Period: 3 years after date of Substantial Completion.

D. Warranty does not include failure of waterproofing due to failure of substrate or formation of new joints and cracks in substrate that exceed 1/16 inch in width.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following Manufacturers and products are acceptable:
   1. Fluid Applied Waterproofing:
      a. Epro Services, Inc., Ecobase Waterproofing Membrane.
      b. Tremco Barrier Solutions, Tuff-N-Dri H8 Waterproofing.
      c. Engineer approved equal.

2.2 PERFORMANCE CRITERIA

A. Waterproofing Membrane:
   1. Single-component, polymer-enhanced liquid-applied membrane with the following minimum properties:
      a. Solids content, ASTM D1644, 60% minimum.
      b. Tensile Strength, ASTM D412: 15 psi, minimum.
      c. Elongation, ASTM D412: 1100%, minimum.
      d. Water Vapor Transmission, ASTM E96: 1 perms maximum (40 mil dry coat).
      e. Hydrostatic Pressure Resistance, 8 feet water head, minimum.
      f. Adhesion, ASTM C836, minimum 11 lb/inch to peel from concrete and masonry.

B. Sealants and Accessories: Manufacturer's recommended sealants and accessories.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
   2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.

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

3.2 PREPARATION

A. Clean and prepare substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Close off penetrations to prevent spillage and migration of waterproofing fluids.

D. Remove grease, oil, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

E. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.

3.3 JOINTS, CRACKS, AND TERMINATIONS

A. Prepare and treat substrates to receive waterproofing membrane, including expansion joints, construction joints, cracks, deck drains, corners, and penetrations according to manufacturer's written instructions.

3.4 MEMBRANE APPLICATION

A. Apply using appropriate equipment and nozzles, per manufacturer’s recommendations. Start application with manufacturer's authorized representative present.

B. Membrane: Spray apply asphalt emulsion membrane to substrates and adjoining surfaces indicated. Spread to a minimum wet thickness per manufacturer’s specification to achieve listed hydrostatic resistance, minimum of 60 mils.

C. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.

D. Allow product to cure prior to backfilling.

E. When buried surfaces that have been waterproofed are not backfilled within 30 days of membrane applications, membrane shall be coated with whitewash. Any formula for mixing the whitewash may be used which is not detrimental to the membrane and produces a uniformly coated white surface which remains until backfill is placed.

3.5 FIELD QUALITY CONTROL

A. Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions; surface preparation; and application of the membrane, flashings, protection, and drainage components; furnish daily reports to Engineer.

3.6 CLEANING AND PROTECTION

A. Protect waterproofing from damage and wear during remainder of construction period.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

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SECTION 07 21 00
THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Foundation wall insulation (supporting backfill).
   2. Concealed building insulation.
   3. Radiant barriers.
   4. Safing insulation.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 4 Section "Unit Masonry" for insulation installed in and masonry cells.
   2. Division 9 Section indicated below for insulation installed as part of metal framed wall and partition assemblies:
      a. "Gypsum Board Assemblies."

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of insulation product specified.

C. Product test reports from and based on tests performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire test response characteristics, water vapor transmission, water absorption, and other properties, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.

B. Fire Test Response Characteristics: Provide insulation and related materials with the fire test response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Surface Burning Characteristics: ASTM E 84.
   2. Fire Resistance Ratings: ASTM E 119.

3. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect plastic insulation as follows:
1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering insulation products that may be incorporated in the Work include, but are not limited to, the following:
1. Extruded Polystyrene Board Insulation:
a. Amoco Foam Products Company.
b. DiversiFoam Products.
c. Dow Chemical Co.
d. UC Industries, Inc.; Owens Corning Co.
2. Glass Fiber Insulation:
a. CertainTeed Corporation.
b. Knauf Fiber Glass GmbH.
c. Owens Corning Fiberglas Corporation.
d. Johns Manville Corporation.

2.2 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards.
1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.

B. Extruded Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation formed from polystyrene base resin by an extrusion process using hydrochlorofluorocarbons as blowing agent to comply with ASTM C 578 for type and with other requirements indicated below:
1. Type IV, 1.60 lb/cu. ft. minimum density, unless otherwise indicated.
2. Surface Burning Characteristics: Maximum flame spread and smoke developed indices of 75 and 450, respectively.

3. Recycled Content: Not less than 50 percent blend of postconsumer and recovered polystyrene resins.

C. Unfaced Mineral Fiber Blanket Insulation: Thermal insulation combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665, Type I (blankets without membrane facing).
   1. Mineral Fiber Type: Fibers manufactured from glass.
   2. Surface Burning Characteristics: Maximum flame spread and smoke developed indices of 25 and 50, respectively.

D. Faced Mineral Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane faced surface with a flame spread of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim kraft, foil scrim, or foil scrim polyethylene vapor retarder membrane on one face; consisting of fibers manufactured from glass.

E. Sound Attenuation Blankets: ASTM C 665, Type I; semi rigid mineral fiber blanket without membrane, Class 25 flame spread. Furnish in 2-3/4", 4" and 6" thicknesses. Provide minimum thickness as required to achieve a minimum 50 STC in all walls.

2.3 SAFING INSULATION AND ACCESSORIES

A. Slag Wool Fiber Board Safing Insulation: Semirigid boards designed for use as fire stop at openings between edge of slab and exterior wall panels, produced by combining slag wool fibers with thermosetting resin binders to comply with ASTM C 612, Type IA and IB; nominal density of 4 lb/cu. ft.; passing ASTM E 136 for combustion characteristics; thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.

B. Calking Compound: Material approved by manufacturer of safing insulation for sealing joint between foil backing of safing insulation and edge of concrete floor slab against penetration of smoke.

C. Safing Clips: Galvanized steel safing clips approved by manufacturer of safing insulation for holding safing insulation in place.

2.4 VAPOR RETARDERS

A. Reinforced Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft., with maximum permeance rating of 0.0507 perm.

B. Vapor Retarder Tape: Pressure sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   1. Reinforced Polyethylene Vapor Retarders:
      a. DURA SKRIM 6WW; Raven Industries, Inc.
      b. Griffolyn T 65; Reef Industries, Inc., Griffolyn Div.

2.5 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

2.6 INSULATION FASTENERS

A. Adhesively Attached, Spindle Type Anchors: Plate welded to projecting spindle; capable of holding insulation, of thickness indicated, securely in position indicated with self locking washer in place; and complying with the following requirements:
   1. Plate: Perforated galvanized carbon steel sheet, 0.030 inch thick by 2 inches square.
   2. Spindle: Copper coated low carbon steel, fully annealed, 0.105 inches in diameter, length to suit depth of insulation indicated.

B. Insulation Retaining Washers: Self locking washers formed from 0.016 inch thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1 1/2 inches square or in diameter.
   1. Where spindles will be exposed to human contact after installation, protect ends with capped self locking washers incorporating a spring steel insert to ensure permanent retention of cap.

C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

D. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   1. Adhesively Attached, Spindle Type Anchors:
      a. TACTOO Insul Hangers; AGM Industries, Inc.
      b. Spindle Type Gemco Hangers; Gemco.
   2. Anchor Adhesives:
      a. TACTOO Adhesive; AGM Industries, Inc.
      b. Tuff Bond Hanger Adhesive; Gemco.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF PERIMETER INSULATION

A. On vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.

B. Protect below grade insulation on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to written instructions of insulation manufacturer.

3.5 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between closed cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Set vapor retarder faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
   1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

D. Install mineral fiber blankets in cavities formed by framing members according to the following requirements:
   1. Use blanket widths and lengths that fill cavities formed by framing members. Where more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
   2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

E. Stuff glass fiber loose fill insulation into miscellaneous voids and cavity spaces. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.

3.6 INSTALLATION OF SAFING INSULATION

A. Install safing insulation to fill gap between edge of concrete floor slab and back of exterior spandrel panels on safing clips spaced as needed to support insulation, but not further apart than 24 inches o.c. Cut safing insulation wider than gap to be filled to ensure compression fit and seal joint between insulation and edge of slab with calking approved by safing insulation manufacturer for this purpose. Leave no voids in completed installation.

3.7 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping not less than 2 wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

C. Seal overlapping joints in vapor retarders with adhesives or vapor retarder tape according to vapor retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor retarder tape. Locate all joints over framing members or other solid substrates.

D. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.

E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor retarder tape to create an airtight seal between penetrating objects and vapor retarder.

F. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor retarder tape or another layer of vapor retarder.

3.8 PROTECTION

A. General: Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 07 22 16
RIGID POLYSTYRENE BOARD INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install rigid tapered polystyrene insulation board on roofs as shown on the Contract Documents

B. Furnish and install rigid polystyrene insulation board for all buried concrete vault roofs and walls as shown on the Contract Documents.

C. Furnish and install rigid polystyrene insulation board for cavity wall masonry construction as shown on the Contract Documents.

1.2 RELATED SECTIONS

A. Section 04 21 13 Anchored Veneer Masonry

B. Section 04 22 00 Concrete Unit Masonry

C. Section 07 62 00 Sheet Metal Flashing and Trim

D. Section 07 92 00 Joint Sealants

1.1 REFERENCES

A. ASTM International (ASTM) standards, most recent editions:

ASTM C36	Standard Specification for Gypsum Wallboard
ASTM C518	Standard Test Method for Steady-State Thermal Transmission Properties by Means of Head Flow Meter Apparatus
ASTM C578	Standard Specification for Rigid, Cellular Polystyrene Insulation
ASTM D1621	Standard Test Method for Compressive Properties of Rigid Cellular Plastics
ASTM D2842	Standard Test Method for Water Absorption of Rigid Cellular Plastics
ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96	Standard Test Method for Water Vapor Transmission of Materials

B. Factory Mutual Global (FMG) standards, most recent editions:

FM 4450	Approval Standard for Class 1 Insulated Steel Roof Decks

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 20 – Submittal Procedures.

B. Product Data
1. Submit manufacturer's technical data for each type of insulation supplied, including adhesive and fasteners.

C. Samples
1. Submit 12 inch by 12 inch sample of insulation and four fasteners.

D. Manufacturers' Instructions
1. Submit manufacturer's installation instructions for preparation and installation specific to the Work of this Section.

1.4 QUALITY ASSURANCE

A. Provide each type of insulation material specified from a single manufacturer.

B. Mock-ups
1. Provide sufficient quantity of materials for construction of masonry mock-up specified in Sections Section 04 21 13 Anchored Veneer Masonry and Section 04 22 00 Concrete Unit Masonry.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 25 10 - Products, Materials, Equipment and Substitutions.

C. Handle products carefully, ensuring board corners are not broken and boards are not damaged.

D. Protect roof insulation materials from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

1.6 FIELD CONDITIONS

A. Ambient Conditions: Apply insulation only when surfaces and ambient temperatures are within manufacturer's prescribed limits.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
   1. Rigid Polystyrene Insulation Board
      a. Dow Chemical Company, Styrofoam Deckmate Plus.
      b. Engineer approved equal.
   1. Mechanical Insulation Anchors
      a. Hilti, IDP Poly Insulation Anchors
      b. Engineer approved equal.

2.2 MATERIALS

A. Rigid Polystyrene Insulation Board for Masonry Cavity Wall
   1. Board: ASTM C578, Type IV, rigid, closed cell type, with integral high density skin.
   2. Thermal Resistance: Typical 5-year aged value of R-5 per 1 inch of thickness per ASTM C518.
   3. Board Size: As necessary to fit between wall anchors.
   4. Board Thickness: 2 inches thick.
   5. Compressive Strength: Minimum 25 psi.
   6. Water Absorption: Maximum of 0.7% by volume in accordance with ASTM D1621
   7. Edges: Square.
   8. Water Vapor Permeance: Maximum 1.1 perms per ASTM E96.
   9. Flame Spread / Smoke Developed Values: 5/165 per ASTM E84.

B. Tapered Roof Board Insulation:
   1. Board: ASTM C578, Type IV, rigid, closed cell type, with integral high density skin.
   2. Thermal Resistance: Typical 5-year aged value of R-5 per 1 inch of thickness per ASTM C518.
   3. Board Size: 24 inches by 96 inches.
   4. Board Slope: 1/4 inch per foot.
   5. Compressive Strength: Minimum 25 psi.
   6. Water Absorption: Maximum of 0.7% by volume in accordance with ASTM D1621
   7. Edges: Square.
   8. Water Vapor Permeance: Maximum 1.1 perms per ASTM E96.
   9. Flame Spread / Smoke Developed Values: 5/165 per ASTM E84.

C. Thermal Barrier
   1. ASTM C36, fire-rated Type X, 1/2 inch thick, ivory faced gypsum board with tapered edges.
   2. 1/4 inch thick silicone treated core, glass mat both faces, fire-rated Type X board meeting UL Class A (Dens-Deck by G-P Gypsum).

D. Bonding Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

E. Mechanical Fasteners
   1. Vault Insulation: In addition to adhesive, use mechanical fasteners to mechanically and permanently bind insulation to the concrete and other surfaces.
   2. Cavity Wall Insulation: Block ties.
   3. Roof Insulation: Screw-type, 6gage, self-drilling and tapping, galvanized steel with sufficient length to securely anchor system into place and to withstand all superimposed loads. Provide complete with 1-1/2 inch diameter 14 gage galvanized steel disks.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that the insulation boards and adjacent materials are compatible and that substrate is sound, clean, and free of oil, grease, and materials or substances that may impede adhesive bond.

3.2 PREPARATION

A. Mechanically fasten thermal barrier to metal deck at FMG 4450 required spacing.

3.3 INSTALLATION

A. Roof insulation
   1. Apply flat fill and sloped roof insulation boards in accordance with approved Shop Drawings
   2. Apply insulation boards parallel to roof perimeter long edges. Stagger end joints.
   3. Lay insulation boards with edges in moderate contact without forcing.
   4. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
   5. When multiple layers of insulation board are used, lay successive layers with joints staggered from pervious layer.
   6. Cut boards to slope for a distance of 24 inches back from roof drains for positive drainage.
   7. Apply no more insulation than can be covered with roofing membrane in same day.
   8. Maintain insulation a minimum of 3 inches from heat emitting devices.

B. Cavity Wall Insulation
   1. Install insulation between cavity wall ties, tight to the masonry back-up. Maintain minimum of 3/4 inch air space between the face of the insulation and the back face of the brick veneer.

3.4 CLEANING

A. Remove from the Site, all containers, wrappings, and scrap insulation material. Leave roofs and floors broom clean.

END OF SECTION

SECTION 07 26 00
VAPOR RETARDERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes site preparation and application of vapor retarder and accessories for installation under concrete slabs.

1.2 REFERENCES

ASTM International (ASTM) standards, most recent editions:

ASTM C33	Standard Specification for Concrete Aggregates.
ASTM D448	Standard Classification for Sizes of Aggregate for Road and Bridge Construction
ASTM E96	Standard Test Methods for Water Vapor Transmission of Materials
ASTM E154	Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
ASTM E1643	Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
ASTM E1745	Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 20 – Submittal Procedures.

B. Product Data
1. Letter of certification that products submitted meet requirements of standards referenced. Provide on manufacturer's letterhead, signed by manufacturer's representative.
2. Manufacturer's product data and installation instructions.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 25 10 - Products, Materials, Equipment and Substitutions.

B. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

C. Store materials in a clean dry area in accordance with manufacturer's instructions.

D. Stack membrane on smooth ground or wood platform to eliminate warping.

E. Protect materials during handling and application to prevent damage or contamination.

F. Ensure membrane is stamped with manufacturer's name, product name and membrane thickness.

1.5 AMBIENT CONDITIONS

A. Do not install product on frozen ground.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Vapor Retarder:
1. Conform to requirements of ASTM E1745, Class A.
2. Maximum permeance per ASTM E96: Less than 0.01 Perms.
3. Maintain permeance of less than 0.01 perms after mandatory conditioning tests per ASTM E154, Sections 8, 11, 12, and 13.
4. Tensile Strength: ASTM E154, 50 pounds/inch.
5. Puncture resistance: ASTM E1745, Class A
6. Water Vapor Retarder: ASTM E1745, Class A.
7. Thickness: 15 mil minimum.

B. Seam Tape:
1. High density polyethylene tape with pressure sensitive adhesive.
2. Thickness: 15 mil minimum.
3. Width: 4 inches minimum.

C. Penetrations of Vapor Retarder
1. Construct boots for pipe and other penetrations through vapor retarder using vapor retarder material and pressure sensitive tape per retarder manufacturer’s instructions.

D. Perimeter/Edge Seal
1. 2-inch wide double sided adhesive tape suitable to bond vapor retarder to perimeter concrete foundation wall.

E. Fine-graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand.
1. ASTM D448, Size 10 with 100 percent passing the 3/8-inch sieve, 10 to 20 percent passing the No. 100 sieve, and at least 5 percent passing the No. 200 sieve.
2. Comply with deleterious substance limits of ASTM C33 for fine aggregates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive membrane. Notify Architecteng if surfaces are not acceptable. Do not begin surface preparation or application of vapor retarder until unacceptable conditions have been corrected.

B. Commencing installation of vapor retarder constitutes acceptance of surfaces.

3.2 PREPARATION

A. Prepare surfaces in accordance with manufacturer's instructions.

3.3 INSTALLATION

A. Installation shall be in accordance with manufacturer's instructions and ASTM E1643.

B. Unroll vapor retarder with the longest dimension parallel to the direction of the pour.

C. Lap vapor retarder over footings and seal to foundation walls.

D. Overlap joints 6 inches and seal with manufacturer's tape.

E. Seal all penetrations (including pipes) with manufacturer's pipe boot.

F. No penetration of the vapor retarder is allowed except for reinforcing steel and permanent utilities.

G. Repair damaged areas by cutting patches of vapor retarder, overlapping damaged area 6 inches and taping all 4 sides with tape.

H. Cover vapor retarder immediately with 2 inches (compacted) of fine graded granular material.

END OF SECTION

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SECTION 07 54 19
POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install fully adhered PVC membrane roofing and tapered insulation system as specified and shown in the Contract Documents.

1.2 RELATED SECTIONS

A. 05 31 00 Steel Decking

B. 06 10 53 Miscellaneous Rough Carpentry

C. 07 62 00 Sheet Metal Flashing and Trim

D. 07 92 00 Joint Sealants

E. 22 14 23 Storm Drainage Piping Specialties

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D1079 “Terminology Relating to Roofing and Waterproofing”; glossary of NRCA's "The NRCA Roofing and Waterproofing Manual"; and the Roof Consultants Institute “Glossary of Roofing Terms” for definition of terms related to roofing work in this Section.

B. Sheet Metal Terminology and Techniques: SMACNA Architectural Sheet Metal Manual.

C. Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Design Standard Practice for Roofing Assemblies," before multiplication by a safety factor.

D. Factored Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Design Standard Practice for Roofing Assemblies," after multiplication by a safety factor.

1.4 REFERENCES

A. ASTM International (ASTM) standards, most recent editions:

ASTM C578	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C728	Standard Specification for Perlite Thermal Insulation Board

ASTM C1289	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D573	Standard Test Method for Rubber—Deterioration in an Air Oven
ASTM D751	Standard Test Methods for Coated Fabrics
ASTM D1149	Standard Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment
ASTM D1204	Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
ASTM D4263	Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4434	Standard Specification for Poly(Vinyl Chloride) Sheet Roofing
ASTM D5036	Standard Practice for Application of Adhered Poly(Vinyl Chloride) Sheet Roofing
ASTM D5082	Standard Practice for Application of Mechanically Attached Poly(Vinyl Chloride) Sheet Roofing
ASTM E108	Standard Test Methods for Fire Tests of Roof Coverings
ASTM E119	Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E548	Standard Guide for General Criteria Used for Evaluating Laboratory Competence

B. Factory Mutual Global (FMG) standards, most recent editions:

FM 4450	Approval Standard for Class 1 Insulated Steel Roof Decks
FM 4470	Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction

C. Sheet Metal & Air Conditioning Contractors' National Association (SMACNA) standards, most recent editions:

Architectural Sheet Metal Manual

D. Single Ply Roofing Institute (SPRI) standards, most recent editions:

WD 1	Wind Design Standard Practice for Roofing Assemblies

E. Standards Council of Canada (CAN/ULC) standards, most recent editions:

CAN/ULC S770	Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams

1.5 ADMINISTRATIVE REQUIREMENTS

A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project Site. Review methods and procedures relating to roof deck construction of a roofing system; including, but not limited to the following:
1. Meet with Owner, Engineer, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

B. Preinstallation Conference: Conduct conference at Project Site. Review methods and procedures related to roofing system; including, but not limited to the following:
1. Meet with Owner, Engineer, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.

5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 20 – Submittal Procedures.

B. Product Data
1. Submit manufacturer's standard product information and performance data for each product indicated.

C. Shop Drawings
1. Submit shop drawings for the roofing system by structure. Include details of the following:
   a. Base flashings and membrane terminations.
   b. Tapered insulation layout, including slopes and limits.
   c. Method and pattern of insulation fastening or adhering.
   d. Sheet layout with perimeter and corners defined.

D. Samples
1. Submit samples of the following products for verification:
   a. 12 inch by 12 inch square of sheet roofing, of color specified, including T shaped side and end lap seam.
   b. 12 inch by 12 inch square of roof insulation.
   c. 12 inch by 12 inch square of walkway pads or rolls.
   d. 12 inch length of metal termination bars.
   e. 12 inch length of battens.
   f. Six insulation fasteners of each type, length, and finish.
   g. Six roof cover fasteners of each type, length, and finish.

E. Certificates
1. Manufacturer Certificate: Submit certificate from roofing manufacturer certifying that the roofing system complies with requirements specified below under "Performance Requirements." Include back-up test results as evidence of meeting performance requirements specified.
2. Installer Certificate: Signed by roofing system manufacturer certifying that installer is approved, authorized, or licensed by manufacturer to install roofing system.

F. Test and Evaluation Reports

1. Submit test reports based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.
2. Maintenance Data: Submit manufacturer's maintenance data for inclusion in operation and maintenance manuals.

B. Manufacturer Inspection Reports: Submit copy of roofing system manufacturer's inspection report of completed roofing installation.

C. Warranty Documentation: Submit warranties specified in this Section.

1.2 QUALITY ASSURANCE

A. Qualifications
1. Manufacturer: A qualified manufacturer that has FMG approval for membrane roofing system identical to that used for this Project.
2. Installer: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
3. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E548.

B. Test Reports
1. Roof drain and leader test, or submit plumber's verification.
2. Core cut (if requested).

C. Moisture Survey
1. Submit prior to installation, results of a non-destructive moisture test of roof system, completed by approved third party. Utilize one of the approved methods below:
   a. Infrared Thermography.
   b. Nuclear Backscatter.

D. Source Limitation: Obtain all components from single source roofing manufacturer.

E. Fire Test Response Characteristics: Provide membrane roofing materials with the fire test response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
1. Exterior Fire Test Exposure: Class A; ASTM E108, for application and roof slopes indicated.
2. Fire Resistance Ratings: ASTM E119, for fire resistance rated roof assemblies of which roofing system is a part.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 25 10 - Products, Materials, Equipment and Substitutions.

B. Deliver roofing materials to Project Site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

C. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

D. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

E. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

G. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.4 SITE CONDITIONS

A. Ambient Conditions: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.5 WARRANTY

A. Special Manufacturer's Warranty: Submit manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
   1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, walkway products and other components of membrane roofing system.
   2. Warranty Period: Fifteen years from date of Substantial Completion.

B. Special Installer's Warranty: Submit roofing installer's warranty against all leaks, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of membrane roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
   1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE / DESIGN CRITERIA

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

C. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
   1. Fire/Windstorm Classification: Class 1A 90.
   2. Hail Resistance: SH.

2.2 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
   1. PVC Roofing System:
      a. Sarnafil, Inc.
      b. Carlisle Syntec Systems.
      c. GAF
      d. Johns Manville
      e. Engineer approved equal.
   2. Polyisocyanurate Board Insulation:
      a. Atlas Roofing Corporation.
      b. Firestone Building Products Company.
      c. Genflex Roofing Systems.
      d. Johns Manville
      e. RMAX.
      f. Engineer approved equal.

2.3 PVC ROOFING MEMBRANE

A. PVC Sheet: ASTM D4434, Type III, fabric reinforced.
   1. Thickness: 60 mils, nominal.
   2. Exposed Face Color: White.
   3. Tearing Strength: 55 lbf minimum; ASTM D751, Procedure B.
   4. Brittleness Point: Minus 22 deg F.
   5. Ozone Resistance: No cracks after sample, wrapped around a 3 inch diameter mandrel, is exposed for 166 hours to a temperature of 104 deg F and an ozone level of 100 pphm; ASTM D1149.

6. Resistance to Heat Aging: 90 percent minimum retention of breaking strength, elongation at break, and tearing strength after 166 hours at 240 deg F; ASTM D573.
7. Water Absorption: Less than 4 percent mass change after 166 hours' immersion at 158 deg F; ASTM D471.
8. Linear Dimension Change: Plus or minus 2 percent; ASTM D1204.

2.4 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
1. Liquid-type auxiliary materials must meet VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet membrane.

C. Bonding Adhesive: Manufacturer's standard solvent-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.

D. Metal Termination Bars: Manufacturer's standard predrilled stainless steel or aluminum bars, approximately 1 inch wide by 1/8 inch thick, with anchors.

E. Metal Battens: Manufacturer's standard aluminum-zinc-allow-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, pre-punched.

F. Fasteners: Factory coated steel fasteners and metal or plastic plates meeting corrosion resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T joint covers, termination reglets, cover strips, and other accessories.

2.5 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.

2.6 ROOF INSULATION

A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

B. Molded Polystyrene Board Insulation: Where tapered insulation, crickets, saddles, tapered edge strips, or other insulation shapes are indicated or required, provide molded-polystyrene board insulation complying with ASTM C578 Type IX, 1.8 lb/cu. ft. minimum density.

C. Polyisocyanurate Board Insulation: ASTM C1289, Type II, felt or glass fiber mat facer on both major surfaces.
   1. Provide in thickness as required to achieve a completed minimum certified Aged@ value of R-28, when tested according to CAN/ULC-S770.
   2. Polyisocyanurate insulation shall be installed in two layers with the total thickness meeting the minimum specified R-Value. Where molded-polystyrene tapered insulation, crickets, saddles, tapered edge strips, or other insulation shapes are indicated, the molded-polystyrene board shall be placed between the layers of polyisocyanurate insulation.

D. Tapered Insulation: Provide factory tapered insulation boards fabricated to slope of 1/4 inch per 12 inches, unless otherwise indicated.

E. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes as required and where indicated for sloping to drain. Fabricate to slopes indicated.

2.7 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

C. Insulation Cant Strips: ASTM C728, perlite insulation board.

D. Wood Nailer Strips: Furnish and install as required per Section 06 10 53 Miscellaneous Rough Carpentry.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
   1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
   2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
   3. Verify that surface plane flatness and fastening of steel roof deck comply with requirements in Section 05 31 00 Steel Decking.
   4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
   5. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.

6. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.

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

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof drain plugs when no work is taking place or when rain is forecast.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 INSULATION INSTALLATION

A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water. Provide batt insulation under decking in all areas where insulation tapers at roof drain assemblies in order to maintain adequate insulation R-values.

F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
   1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

G. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
   1. Prime surface of concrete deck with primer, as recommended by manufacturer, at rate as recommended by manufacturer and allow primer to dry.
   2. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

H. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board type roof insulation to deck type.
   1. Fasten insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
   2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

3.4 ADHERED MEMBRANE ROOFING INSTALLATION

A. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.
   1. Install sheet according to ASTM D5036.

B. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.

C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.

E. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.

F. Apply membrane roofing with side laps shingled with slope of roof deck where possible.

G. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
   1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
   2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
   3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

H. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.

3.5 MECHANICALLY FASTENED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
   1. Install sheet according to ASTM D5082.

B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.

C. Accurately align roofing membranes and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

E. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

F. Seams: Clean seam areas, overlap roofing membrane, and hot air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.
   1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
   2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
   3. Repair tears, voids, and lapped seams in roofing membrane that does not meet requirements.

G. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

H. In Splice Attachment: Secure one edge of roofing membrane using fastening plates or metal battens centered within membrane splice and mechanically fasten roofing membrane to roof deck. Field splice seam.

3.6 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply solvent based bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Flash penetrations and field formed inside and outside corners with sheet flashing.

D. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars

3.7 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions

3.8 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Engineer.

B. Notify Engineer 48 hours in advance of date and time of inspection.

C. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

D. Perform additional testing and inspecting, at no additional expense to Owner to determine compliance of replaced or additional work with specified requirements.

3.9 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Engineer.

B. Correct deficiencies in, or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction

3.10 ATTACHMENTS

A. Roofing Installers Warranty

END OF SECTION

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Roofing Installer's Warranty

WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

Owner	_____
Address	_____
Building Name	_____
Address	_____
Area of Work	_____
Acceptance Date	_____
Warranty Period	_____
Expiration Date	_____

AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

This Warranty is made subject to the following terms and conditions:

Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

- Lightning,
- Peak gust wind speed exceeding 90 mph,
- Fire,
- Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition,
- Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
- Vapor condensation on bottom of roofing,
- Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.

Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20___

Authorized Signature: _____

Name: _____

Title: _____

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following sheet metal flashing and trim:
   1. Manufactured reglets.
   2. Formed roof drainage system.
   3. Formed low-slope roof flashing and trim.
   4. Formed wall flashing and trim.
   5. Formed equipment support flashing.

B. Related Sections include the following:
   1. Division 6 Section "Miscellaneous Carpentry" for wood nailers, curbs, and blocking.
   2. Division 7 Section "Roof Accessories" for set-on-type curbs, roof hatches, and other manufactured roof accessory units.
   3. Division 7 Section "Joint Sealants" for field-applied sheet metal flashing and trim sealants.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 Section Includes:
   1. Wind Zone 1: For velocity pressures of (21 to 30 lbf/sq. ft.): (60-lbf/sq. ft.) perimeter uplift force, (90-lbf/sq. ft.) corner uplift force, and (30-lbf/sq. ft.) outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.
   1. Temperature Change (Range): (120 deg F), ambient; (180 deg F), material surfaces.

D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop and field assembled work. Include the following:
   1. Identify material, thickness, weight, and finish for each item and location in Project.
   2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
   3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
   4. Details of expansion joint covers, including showing direction of expansion and contraction.

C. Samples for Selection: For each type of sheet metal flashing and trim indicated with factory applied color finishes.
   1. Include similar Samples of trim and accessories involving color selection.

1.5 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

B. Mockups: Prior to installing sheet metal flashing and trim, construct mockups indicated to verify selections made under Sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.
   1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
   2. Notify Architect one week in advance of the dates and times when mockups will be constructed.
   3. Demonstrate the proposed range of aesthetic effects and workmanship.
   4. Construct mockups for the following type of sheet metal flashing and trim:
      a. Exposed trim, gravel stops, and fasciae.
      b. Copings.
   5. Obtain Architect's approval of mockups before start of final unit of Work.
   6. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
      a. When directed, demolish and remove mockups from Project site.
      b. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
   1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including

installers of roofing materials, roof accessories, unit skylights, and roof mounted equipment.
2. Review methods and procedures related to sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 SHEET METALS

A. Zinc Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, (G90) coating designation; structural quality, mill phosphatized for field painting.

B. Pre-painted, Metallic Coated Steel Sheet: Steel sheet metallic coated by the hot dip process and prepainted by the coil coating process to comply with ASTM A 755/A 755M.
1. Recycled Content: Provide steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

2. Zinc Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, (G90) coating designation; structural quality.
3. Exposed Finishes: Apply the following coil coating:
    a. High Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
        1) Fluoropolymer 3 Coat System: Manufacturer's standard 3 coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of (1.5 mil); complying with physical properties and coating performance requirements of AAMA 2605, except as modified below:
            a) Humidity Resistance: 2000 hours.
            b) Salt Spray Resistance: 2000 hours.
        2) Color: Custom color as selected by Architect from manufacturer's full range, to match existing, including deep tone colors.

C. Lead Sheet: ASTM B 749, Type L51121, copper bearing lead sheet.

D. Zinc Sheet: Electrolytic, 99 percent pure zinc alloyed with 1 percent titanium and copper.
1. Finish: Bright rolled.

2.3 UNDERLAYMENT MATERIALS

A. Polyethylene Sheet: (6 mil) thick polyethylene sheet complying with ASTM D 4397.

B. Slip Sheet: Rosin sized paper, minimum (3 lb/100 sq. ft.).

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Wood screws, annular threaded nails, self tapping screws, self locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory applied coating.
2. Fasteners for Flashing and Trim: Blind fasteners or self drilling screws, gasketed, with hex washer head.
3. Blind Fasteners: High strength aluminum or stainless steel rivets.
4. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

C. Solder for Lead: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.

D. Solder for Zinc: ASTM B 32, 60 percent lead and 40 percent tin with low antimony, as recommended by manufacturer.

E. Burning Rod for Lead: Same composition as lead sheet.

F. Sealing Tape: Pressure sensitive, 100 percent solids, polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

G. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

H. Butyl Sealant: ASTM C 1311, single component, solvent release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked type expansion joints with limited movement.

I. Bituminous Coating: Cold applied asphalt mastic, SSPC Paint 12, compounded for (15 mil) dry film thickness per coat. Provide inert type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory mitered and welded corners and junctions.
   1. Available Manufacturers:
      a. Fry Reglet Corporation.
   2. Material: Galvanized steel, (0.0217 inch) thick.
   3. Surface Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
   4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
      a. Available Manufacturers:
         1) Cheney Flashing Company, Inc., Type B Snap Lock.
   5. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
   6. Counterflashing Wind Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.6 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
   1. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat lock seams. Tin edges to be seamed, form seams, and solder.

D. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

E. Seams: Comply with SMACNA AArchitectural Sheet Metal Manual@, (Sixth Edition, September 2003) Figure no. 3-2 and 3-3 as applicable to specific installations.
   1. Standing Seams: Provide double lock standing seams (detail no. 25, figure no. 3-3), with finish not less than 1-1/4" high.

F. Expansion Provisions: Where lapped or bayonet type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than (1 inch) deep, filled with elastomeric sealant concealed within joints.

G. Conceal fasteners and expansion provisions where possible on exposed to view sheet metal flashing and trim, unless otherwise indicated.

H. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
   1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

2.7 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum (96 inch) long sections. Furnish flat stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.
   1. Gutter Style: D and as detailed.
   2. Expansion Joints: Built in.
   3. Accessories: Continuous removable leaf screen with sheet metal frame and hardware cloth screen.
   4. Gutters with Girth up to (15 Inches): Fabricate from the following material:
      a. Prepainted, Metallic Coated Steel: 0.0299 inch thick.

B. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
   1. Fabricate downspouts from the following material:
      a. Prepainted, Metallic Coated Steel: 0.0299 inch thick.

2.8 LOW SLOPE ROOF SHEET METAL FABRICATIONS

A. Copings: Fabricate in minimum (96 inch) long, but not exceeding (10 foot) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
   1. Joint Style: Standing seams.
   2. Fabricate copings from the following material:
      a. Prepainted, Metallic Coated Steel: 0.0396 inch thick.

B. Roof and Roof to Wall Transition Expansion Joint Cover: Fabricate from the following material:
   1. Prepainted, Metallic Coated Steel: 0.0336 inch thick.

C. Base Flashing: Fabricate from the following material:
   1. Galvanized Steel: 0.0276 inch thick.

D. Counterflashing: Fabricate from the following material:
   1. Galvanized Steel: 0.0217 inch thick.

E. Flashing Receivers: Fabricate from the following material:
   1. Galvanized Steel: 0.0217 inch thick.

F. Roof Penetration Flashing: Fabricate from the following material:
   1. Galvanized Steel: 0.0276 inch thick.

2.9 WALL SHEET METAL FABRICATIONS

A. Through Wall Flashing: Fabricate continuous flashings in minimum (96 inch) long, but not exceeding (12 foot) long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend (6 inches) beyond each side of wall openings. Form with (2 inch) high end dams. Fabricate from the following material:
   1. Zinc: 0.040 inch thick.

B. Openings Flashing in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with (2 inch) high end dams. Fabricate from the following material:
   1. Prepainted, Metallic Coated Steel: 0.0217 inch thick.

C. Wall Expansion Joint Cover: Fabricate from the following material:
   1. Prepainted, Metallic Coated Steel: 0.0276 inch thick.

2.10 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following material:
   1. Galvanized Steel: 0.0276 inch thick.

2.11 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
   1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
   1. Coat side of sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
   3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   1. Space cleats not more than (12 inches) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of (10 feet) with no joints allowed within (24 inches) of corner or intersection. Where lapped or bayonet type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than (1 inch) deep, filled with elastomeric sealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than (1 1/4 inches) for nails and not less than (3/4 inch) for wood screws.
   1. Galvanized or Prepainted, Metallic Coated Steel: Use stainless steel fasteners.

H. Seal joints with elastomeric sealant as required for watertight construction.
   1. Where sealant filled joints are used, embed hooked flanges of joint members not less than (1 inch) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between (40 and 70 deg F), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant type joints at temperatures below (40 deg F).
   2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of (1 1/2 inches) except where pretinned surface would show in finished Work.
   1. Do not solder prepainted, metallic coated steel sheet.
   2. Pretinning is not required for lead.
   3. Where surfaces to be soldered are lead coated, do not tin edges, but wire brush lead coating before soldering.
   4. Do not use open flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1 49 for specified wind zone and as indicated.
   1. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at 16 inch centers.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1 49 for specified wind zone and as indicated.
   1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at 16 inch centers.
   2. Anchor interior leg of coping with screw fasteners and washers at 18 inch centers.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close fitting collar with top edge flared for elastomeric sealant, extending a minimum of (4 inches) over base flashing. Install stainless steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing (4 inches) over base flashing. Lap counterflashing joints a minimum of (4 inches) and bed with elastomeric sealant.
   1. Secure in a waterproof manner by means of snap in installation and sealant.

F. Roof Penetration Flashing: Coordinate installation of roof penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
   1. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.4 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall opening components such as windows, doors, and louvers.

B. Through Wall Flashing: Installation of formed through wall flashing is specified in Division 4 Section "Unit Masonry Assemblies."

C. Reglets: Installation of reglets is specified in Division 3 Section "Cast in Place Concrete and in 4 Section "Unit Masonry Assemblies."

D. Openings Flashing in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.5 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

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SECTION 07 72 00
ROOF ACCESSORIES

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall provide all roof accessories and appurtenant work, complete, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Trade Standards

National Roofing Contractors Association (NRCA).

1.3 CONTRACTOR SUBMITTALS

A. All submittals shall be in accordance with Section 01 33 20 - Contractor Submittals.

B. The manufacturer's specifications, literature, and published installation instructions for each accessory, product, or system shall be submitted.

C. Shop drawings shall be submitted for all roof hatches, Bermuda-type ventilators, and openable fire and smoke hatches with skylights, prior to fabrication.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken, packages, containers, or bundles bearing the name of the manufacturer.

B. Storage: All materials shall be carefully stored on wood blocking in an area that is protected from the elements. Storage shall be in a manner that will prevent damage or marring of finish.

PART 2 - PRODUCTS

2.1 ROOF VENTS

A. Roof relief vents with bird screens shall be provided, and shall be of the type recommended by the National Roofing Contractor's Association (NRCA) and approved by the roofing manufacturer.

2.2 PREFABRICATED CURBS

A. Design: Opening dimensions shall be coordinated with roof-mounted equipment sizes. Heights shall be as required to place top of curb not less than 8 inches above top of insulation. The top edge of the curb shall be a level surface for installation, connection or mounting of equipment. Sides of curbs shall have heights adjusted per job and field conditions and roof

stoops. Base flange shall be not less than 4 inches wide. Curbs shall be fabricated of 14 gauge or thicker galvanized steel with continuously welded corners and shall be provided with pressure preservative treated, kiln dried, fire-treated wood nailer at top.

B. Manufacturers, or Equal
   1. Pate Company.
   2. S & L Manufacturing Company.
   3. Thybar Corporation.

PART 3 - EXECUTION

3.1 GENERAL

A. The installation shall conform to applicable codes and the manufacturers published or written recommendations, specifications, and published installation instructions for the type of work being performed. The construction shall be coordinated with the work of other trades.

B. All roof openings and roof-mounted equipment shall be provided with a prefabricated curb unless the equipment above the roof opening is supplied with its own curb which extends to 8 inches or higher beyond the top of the roof insulation.

3.2 INSTALLATION

A. Protective Coating: All roof accessories shall be coated in accordance with Section 09900 Coatings and Painting, to match the roofing color unless directed otherwise by the Architect. Primer coats shall be compatible with finish coats.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sealant work associated with joints between similar and dissimilar materials in the Work.

B. Work included consists of, but is not necessarily limited to the following:
   1. Sealing all joints which would otherwise permit penetration of moisture, unless sealing work is specifically required under other sections.
      a. Flashing reglets and retainers.
      b. Exterior wall joints.
      c. Flooring joints.
      d. Isolation joints.
      e. Joints between paving and sidewalks and building.
      f. Concrete control and expansion joints, exterior and interior.
      g. Joints at penetrations of walls, floors, and decks by piping and other services and equipment.
      h. Exterior and interior perimeters of exterior and interior door and window frames, louvers, grilles, etc.
      i. Thresholds at exterior doors.
      j. Sealing of plumbing fixtures to floor or wall.
      k. Other joints where calking, sealant, or compressible sealant is indicated.

1.2 REFERENCES

A. ASTM International (ASTM) standards, most recent editions:

ASTM C920	Standard Specification for Elastomeric Joint Sealants
ASTM C1087	Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems
ASTM C1193	Standard Guide for Use of Joint Sealants
ASTM C1247	Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids

B. Federal Specification (FS), most recent editions:

TT-S-001543A	Sealing Compound: Silicone Rubber Base (for Caulking, Sealing, and Glazing in Buildings and Other Structures)

TT-S-00230C	Sealing Compound: Elastomeric Type, Single Component (For Calking, Sealing, and Glazing in Buildings and Other Structures)
TT-S-00227E	Sealing Compound: Elastomeric Type, Multi-Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures)

C. Underwriters Laboratories Inc. (UL):

Building Materials Directory

D. National Sanitation Foundation (NSF), most recent edition:

NSF 61	Drinking Water System Components, Health Effects

1.3 DEFINITIONS

A. Words "calk," "sealant," and "calking" mean sealant Work.

B. "Interior wet areas" mean toilets, showers, sinks, and similar areas.

C. "Applicator" means the individual actually on site performing the installation.

D. "Vertical" means any surface with a slope greater than 1.5 horizontal to 1.0 vertical.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 20 – Contractor Submittals.

B. Product Data
1. Letter of certification that products submitted meet requirements of standards referenced.
2. Manufacturer's installation instructions.
3. Manufacturer's recommendations for joint cleaner, primer, backer rod, tooling, and bond breaker.
4. Applicator qualifications.
5. Warranty.
6. Certification from sealant manufacturer stating that product being used is recommended for and is best suited for joint in which it is being applied.

C. Field Samples
1. Cured sample of each color for Engineer's color selection. Color chart not acceptable.

D. Preconstruction field test reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in below in QUALITY ASSURANCE.

E. Product test reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.

F. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Sealant applicator shall have a minimum of five years of experience on projects with similar scope.

B. Mock-ups:
   1. Before caulking work is started, a sample of each type of joint shall be caulked where directed by Architect. The approved samples shall show the workmanship, bond, and color of calking materials as specified or selected for the Work and shall be the minimum standard of quality on the entire Project.

C. Preconstruction compatibility and adhesion testing:
   1. Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact of affect joint sealants.
      a. Use ASTM C1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
      b. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
      c. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
      d. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
      e. Testing will not be required if sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

D. Preconstruction field-adhesion testing: Before installing elastomeric sealants, field test their adhesion to joint substrates found in the Work as follows:
   1. Locate test joints where indicated in the Work or, if not indicated, as directed by the Architect.
   2. Conduct tests for each application indicated below:
      a. Each type of elastomeric sealant and joint substrate indicated.
   3. Notify Architect a minimum of 7 days in advance of dates and times when test joints will be evaluated.
   4. Test method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 of ASTM C1193.
   5. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
   6. Evaluation of preconstruction field-adhesion test results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with

requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 25 10 - Products, Materials, Equipment and Substitutions.

B. Deliver material in manufacturer's original unopened containers with labels intact. Labels shall indicate contents and expiration date of material.

C. Store all materials off the ground and protect from rain, freezing, or excessive heat until ready for use.

D. Condition the specified products before use as recommended by the manufacturer.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Schedule Work to be performed when temperature and humidity are as recommended by the sealant manufacturer during and after installation until products are fully cured.

1.8 WARRANTY

A. Material and Labor Warranty:
   1. Sealant work shall be free of defects for a period of 5 years from date of final acceptance.
   2. Failure of watertightness constitutes defect.
   3. Remove any defective work and/or materials and replace with new materials.
   4. Warranty must be sighed jointly by applicator and sealant manufacturer.

B. Special installer’s warranty:
   1. Installer’s standard form in which installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified herein within specified warranty period.
      a. Warranty period: Five years from date of final acceptance.
   2. Special warranties herein specified exclude deterioration or failure of elastomeric joint sealants from the following:
      a. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer’s written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design.
      b. Disintegration of joint substrates from natural causes exceeding design specifications.
      c. Mechanical damage by individuals, tools, or other outside agents.
      d. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
   1. Polyurethane sealants.
      a. MAMECO International.
      b. Pecora.
      c. PSI Polymeric Systems, Inc.
      d. Sika Chemical Corporation.
      e. Sonneborn – Rexnord.
      f. Tremco
      g. Engineer approved equal.
   2. Silicone sealants:
      a. Dow Corning Corporation.
      b. General Electric.
      c. Tremco
      d. Engineer approved equal.
   3. Fire Resistant Sealant:
      a. 3M Corporation.
      b. Dow Corning.
      c. Engineer approved equal.

2.2 MATERIALS

A. Sealants – General:
   1. Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
   2. Where compound is exposed to view in finished Work, provide colors matching materials being sealed.
   3. Where compound is not exposed to view in finished Work, provide manufacturer's color with best performance.
   4. For joints in potable water reservoirs, provide only 2-component polyurethane sealant with NSF 61 certification.
   5. Provide non sagging sealant for vertical and overhead joints.
   6. Sealants for horizontal joints:
      a. Self-leveling pedestrian/traffic grade.
   7. Suitability for immersion in liquids: Where elastomeric sealants are indicated for submerged use, provide products that have undergone testing according to ASTM C1247 and qualify for the length of exposure indicated by reference to ASTM C920 for Classes 1 or 2. Liquid used for testing sealants is chlorinated potable water, unless otherwise noted.

B. Polyurethane Sealant:
   1. One or two components.
   2. Meet ASTM C920; F.S. TT-S-00230C, Type I or Type II, Class A, or TT-S-00227E, Type I or Type II, Class A.

a. Pecora Dynatrol I, Dynatrol II, Urexpan NR-200 or NR-201.
b. PSI PSI-270.
c. Sika Sikaflex-1A, Sikaflex-2C.
d. Sonneborn Sonolastic NP-1, NP-II, SL-1.
e. Tremco Vulkem 116, 227, 45, 245.

C. Silicone Sealant:
1. One component.
2. Meet F.S. TT-S-001543A, Class A:
a. Dow Corning 790, 795, 786.
b. General Electric Silpruf, Silglaze, Sanitary SCS 1700 sealant.
c. Tremco Spectrem.

D. Bond breaker tape: Polyethylene tape of other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint surfaces of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.
1. Unless specifically shown on the Drawings, bond breaker shall not be used in joints within the reservoir.

E. Joint Cleaner, Primer, Bond Breaker:
1. As recommended by sealant manufacturer.

F. Sealant Backer Rod: Closed cell polyethylene, polyethylene jacketed polyurethane foam, or other flexible, non-absorbent, non-bituminous material recommended by sealant manufacturer to:
1. Control joint depth
2. Break bond of sealant oat bottom of joint
3. Provide proper shape of sealant bead.

G. Fire-Resistant Sealant:
1. One or two component.
2. Furnish sealant which has been tested for use as a fire and smoke penetration seal.
a. 3M Corporation Fire Dam 150.
b. Dow Corning Firestop.
3. UL approved for intended use.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before using any sealant, investigate its compatibility with adjacent joint surfaces, fillers, and other materials in the joint system.

B. Use only compatible materials.

C. Clean and prime joint surfaces in accordance with manufacturer's instructions.
1. Limit application to surfaces to receive sealant.
2. Mask off adjacent surfaces.

D. Commencing sealant installation constitutes acceptance of joints and surfaces.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Where finish coating or covering is to be applied to surface, wait until such coating or covering has been applied before installing sealant; e.g., paint, wall covering, glazed coatings.

C. Make all joints water and air tight.

D. Make depth of sealing compounds not more than one-half width of joint, but in no case less than 1/4 inch nor more than 5/8 inch.

E. Provide correctly sized backer rod in all joints to proper depth

F. Apply bond breaker where required.

G. Tool sealants using sufficient pressure to fill all voids.

H. Upon completion, leave sealant with smooth even neat finish.

3.3 CLEANING

A. Clean adjacent soiled surfaces free of sealant.

3.4 PROTECTION

A. Protect finished installation.

B. Protect sealants until fully cured.

3.5 SCHEDULES

A. Furnish sealant as indicated for the following areas:
    1. Exterior areas:
        a. Joints in concrete and masonry:
            1) Use 2-component polyurethane only.
        b. All other joints:
            1) Single or 2-component Polyurethane or.
            2) Silicone.
    2. Interior wet areas:
        a. Joints in concrete and masonry:
            1) Use 2-component polyurethane only.
        b. All other joints:
            1) Single or 2-component Polyurethane or.
            2) Silicone.
    3. Interior non-wet, corrosive areas:
        a. Joints in concrete and masonry:
            1) Use 2-component polyurethane only.

b. All other joints:
    1) Single or 2-component Polyurethane or.
    2) Silicone.

4. Interior non-wet, drywall and plaster noncorrosive areas:
    a. All Joints:
        1) Single or 2-component Polyurethane or.
        2) Silicone.

5. Fire-rated construction: Fire-resistant sealant.

END OF SECTION

DIVISION 08
OPENINGS

SECTION 08 11 13
STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Steel doors.
   2. Steel door frames.
   3. Sidelight frames

B. Related Sections include the following:
   1. Division 4 Section "Unit Masonry Assemblies" for installing anchors and grouting frames in masonry construction.
   2. Division 8 Section "Flush Wood Doors" for wood doors installed in steel frames.
   3. Division 8 Section "Door Hardware" for door hardware and weather stripping.
   4. Division 8 Section "Glazing" for glass in glazed openings.
   5. Division 9 Section "Gypsum Board Assemblies" for spot grouting frames installed in steel framed gypsum board partitions.
   6. Division 9 Section "Painting" for field painting factory primed doors and frames.

1.3 DEFINITIONS

A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic coated steel sheets.

1.4 SUBMITTALS

A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire resistance ratings, and finishes.

B. Shop Drawings: Show the following:
   1. Elevations of each door design.
   2. Details of doors including vertical and horizontal edge details.
   3. Frame details for each frame type including dimensioned profiles.
   4. Details and locations of reinforcement and preparations for hardware.
   5. Details of each different wall opening condition.
   6. Details of anchorages, accessories, joints, and connections.
   7. Coordination of glazing frames and stops with glass and glazing requirements.

C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

D. Oversize Construction Certificates: For door assemblies required to be fire protection rated and exceeding size limitations of labeled assemblies.

E. Metallic Construction Certificates: For door assemblies (doors and frames) required to be of metallic coated steel for compliance with this specification section.

1.5 QUALITY ASSURANCE

A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

B. Fire Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire protection ratings indicated, based on testing according to NFPA 252.
   1. Test Pressure: Test at atmospheric pressure.
   2. Oversize Fire Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire rated door assemblies except for size.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames cardboard wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory finished doors and frames.

B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new Work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4 inch high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4 inch spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Steel Doors and Frames:
      a. Amweld Building Products, Inc.
      b. Ceco Door Products; a United Dominion Company.

c. Curries Company.
d. Kewanee Corporation (The).
e. Pioneer Industries Inc.
f. Republic Builders Products.
g. Steelcraft; a division of Ingersoll Rand.

2.2 MATERIALS

A. Hot Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher leveled standard of flatness.

C. Metallic Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 zinc iron alloy (galvannealed) coating; stretcher leveled standard of flatness.

D. Electrolytic Zinc Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher leveled standard of flatness where used for face sheets.

2.3 DOORS

A. General: Provide doors of sizes, thicknesses, and designs indicated.

B. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical endurance level:
1. Level 4 and Physical Performance Level A (Maximum Duty), Model 2 (Seamless) (14 gauge face).

C. Vision Lite Systems: Manufacturer's standard kits consisting of glass lite moldings to accommodate glass thickness and size of vision lite indicated.

2.4 FRAMES

A. General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.

B. Exterior Frames: Fabricated from metallic coated steel sheet.
1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
2. Frames for Level 4 Steel Doors: 0.067 inch (1.7 mm) (16 gauge) thick steel sheet.

C. Interior Frames: Fabricated from cold rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.
1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
2. Frames for Wood Doors: 0.067 inch (16 gauge) thick steel sheet.

D. Door Silencers: Except on weather stripped frames, fabricate stops to receive three silencers on strike jambs of single door frames and two silencers on heads of double door frames.

E. Plaster Guards: Provide 0.016 inch thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.

F. Supports and Anchors: Fabricated from not less than 0.042 inch thick, electrolytic zinc coated or metallic coated steel sheet.
   1. Wall Anchors in Masonry Construction: 0.177 inch diameter, steel wire complying with ASTM A 510 may be used in place of steel sheet.

G. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

2.5 FABRICATION

A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify Work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053 inch thick, metallic coated steel channels with channel webs placed even with top and bottom edges.

C. Core Construction: Manufacturer's standard core construction that produces a door complying with SDI standards.

D. Clearances for Non Fire Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between pairs of doors. Not more than 3/4 inch at bottom.

E. Clearances for Fire Rated Doors: As required by NFPA 80.

F. Single Acting, Door Edge Profile: Beveled edge.

G. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

H. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold or hot rolled steel sheet.

I. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

J. Thermal Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.

1. Unless otherwise indicated, provide thermal rated assemblies with U value of 0.41 Btu/sq. ft. x h x deg F or better.

K. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.
1. For concealed overhead door closers, provide space, cutouts, reinforcement, and provisions for fastening in top rail of doors or head of frames, as applicable.

L. Frame Construction: Fabricate frames to shape shown.
1. Fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
2. For exterior applications, fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
3. Provide welded frames with temporary spreader bars.
4. Provide terminated stops where indicated.
5. Provide metallic-coated steel sheet at all exterior locations and at all wet areas.

M. Reinforce doors and frames to receive surface applied hardware. Drilling and tapping for surface applied hardware may be done at Project site.
1. Provide auxiliary hinge reinforcement at all hinge locations on every frame.

N. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

O. Glazing Stops: Manufacturer's standard, formed from 0.032 inch thick steel sheet.
1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
2. Provide screw applied, removable, glazing stops on inside of glass, louvers, and other panels in doors.

P. Astragals: As required by NFPA 80 to provide fire ratings indicated.

2.6 FINISHES

A. Prime Finish: Manufacturer's standard, factory applied coat of rust inhibiting primer complying with ANSI A250.10 for acceptance criteria.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are

set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.
2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T shaped anchors.
3. In existing concrete or masonry construction, provide at least three completed opening anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
4. In metal stud partitions, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws.
5. Install fire rated frames according to NFPA 80.
6. For openings 90 inches or more in height, install an additional anchor at hinge and strike jambs.

C. Door Installation: Comply with ANSI A250.8. Fit hollow metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.

1. Fire Rated Doors: Install within clearances specified in NFPA 80.

3.2 ADJUSTING AND CLEANING

A. Prime Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air drying primer.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS

GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Solid core doors with wood veneer faces.
   2. Factory finishing flush wood doors.

B. Related Sections include the following:
   1. Division 8 Section "Glazing" for glass view panels in flush wood doors.

1.3 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
   1. Indicate dimensions and locations of mortises and holes for hardware.
   2. Indicate dimensions and locations of cutouts.
   3. Indicate requirements for veneer matching.
   4. Indicate doors to be factory finished and finish requirements.
   5. Indicate fire ratings for fire doors.

C. Samples for Selection: Color charts consisting of actual materials in small sections for the following:
   1. Faces of Factory Finished Doors: Show the full range of colors available for stained finishes.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

C. Quality Standard: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated."
   1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

D. Forest Certification: Provide doors made with all wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

E. Fire Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
   1. Test Pressure: Test at atmospheric pressure.
   2. Temperature Rise Rating: At exit enclosures, provide doors that have a temperature rise rating of 450 deg F maximum in 30 minutes of fire exposure.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by manufacturer, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch in a 42 by 84 inch section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3 inch span.
   1. Warranty shall be in effect during the following period of time from date of Substantial Completion:
      a. Solid Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Flush Wood Doors:
      a. Algoma Hardwoods Inc.
      b. Buell Door Company.
      c. Eggers Industries; Architectural Door Division.
      d. GRAHAM Manufacturing Corp.
      e. Oshkosh Architectural Door Co.
      f. VT Industries Inc.

g. Marshfield DoorSystems, Inc.

2.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. Doors for Transparent Finish:
1. Grade: Premium, with Grade AA faces.
2. Species and Cut: Select White Maple, flat sliced.
3. Match between Veneer Leaves: Slip match.
4. Assembly of Veneer Leaves on Door Faces: Balance match.
5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
6. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
7. Stiles: Same species as faces.

2.3 SOLID CORE DOORS

A. Particleboard Cores: Comply with the following requirements:
1. Particleboard: ANSI A208.1, Grade LD 2.
a. Use particleboard made with binder containing no urea formaldehyde resin.
2. Blocking: Provide wood blocking in particleboard core doors as follows:
a. 5 inch top rail blocking, in doors indicated to have closers.
b. 5 inch bottom rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
c. 5 inch midrail blocking, in doors indicated to have exit devices.

B. Interior Veneer Faced Doors:
1. Core: Particleboard.
2. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.

C. Fire Rated Doors:
1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral core construction as needed to provide fire rating indicated. Door construction to contain no Urea Formaldehyde.
2. Blocking: For mineral core doors, provide composite blocking with improved screw holding capability approved for use in doors of fire ratings indicated as follows:
a. 5 inch top rail blocking.
b. 5 inch bottom rail blocking, in doors indicated to have protection plates.
c. 5 inch midrail blocking, in doors indicated to have armor plates.
d. 5 inch midrail blocking, in doors indicated to have exit devices.
3. Edge Construction: At hinge stiles, provide manufacturer's standard laminated edge construction with improved screw holding capability and split resistance and with outer stile matching face veneer.

4. Pairs: Provide fire rated pairs with fire retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed steel edges and astragals. Provide stiles with concealed intumescent seals.

2.4 FABRICATION

A. Fabricate doors in sizes indicated for Project site fitting.
1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire rated doors.

B. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
1. Light Openings: Trim openings with moldings of material and profile indicated.

2.5 FACTORY FINISHING

A. General: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated" for factory finishing.

B. Finish doors at factory.

C. Transparent Finish:
1. Grade: Premium.
2. Finish: AWI System TR 6 catalyzed polyurethane.
3. Staining: As selected by Architect from manufacturer's full range.
4. Effect: Open grain finish.
5. Sheen: Semigloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.
1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
1. Install fire rated doors in corresponding fire rated frames according to NFPA 80.

C. Job Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or

permitted for fire rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold.
   a. Comply with NFPA 80 for fire rated doors.
2. Bevel non fire rated doors 1/8 inch in 2 inches at lock and hinge edges.
3. Bevel fire rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

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SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall provide aluminum fixed windows and all appurtenant Work, complete, in accordance with the requirements of the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards

ASTM E 283	Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
ASTM E 330	Test Method for Structural Performance of Exterior Windows, Curtain Walls, and doors by Uniform Static Air Pressure Difference.
ANSI A 58.1	Wind Pressures.

B. Trade Standards

AAMA (1984)	[Voluntary Guide Specification for Aluminum Architectural Windows].
AAMA GS-001 (1984)	Guide Specification on Architectural Grade Windows.

1.3 CONTRACTOR SUBMITTALS

A. General: Submittals shall be in accordance with Section 01 33 20 - Contractor Submittals.

B. Shop Drawings: Shop drawings shall be submitted for each type of aluminum window unit indicated. Include the following:
   1. Drawings showing individual unit elevations, glazing details, and full-size details of typical composite members.
   2. Details describing each window type and each variation of opening condition with specific information on connections to adjoining materials. Anchorage and accommodation of accessory items shall be shown as they occur.
   3. Elevations of each window design and type, providing specific information defining glazing, operating lites and accessory items.
   4. Details defining construction, joints, connections and location and installation requirements of operating hardware and any supplemental reinforcement which may be necessary.

C. Product Data: Manufacturer's technical product data, recommendations, and standard details for aluminum window units, including certified test laboratory reports as necessary to show compliance with requirements.

D. Sample: Sample of aluminum finish coat with selected color.

1.4 QUALITY ASSURANCE

A. References: Except as otherwise indicated, requirements for aluminum windows, terminology and standards of performance, and fabrication workmanship are those specified and recommended in ANSI/AAMA 302.9 and applicable general recommendations published by the Architectural Aluminum Manufacturers Association (AAMA) and the Aluminum Association (AA).

B. System Performance Requirements: Except as otherwise indicated, fixed aluminum windows shall comply with the following air infiltration, water resistance, uniform load deflection, and uniform load structural tests as specified in ANSI/AAMA 302.9 for the types and classifications of window units required.

1. Air Infiltration Test: Air infiltration maximum 0.10 cfm per foot of crack length at 6.24-psi pressure differential when tested in accordance with ASTM E 283.
2. Water Resistance Test: No uncontrolled water leakage at 10.00-psf pressure differential with water rate of 5 gallons per hour per square foot when tested in accordance with ASTM E 331.
3. Uniform Load Deflection Test: No glass breakage, permanent damage to fasteners, hardware parts, or damage to make window inoperable or deflection of any unsupported span (meeting rails, muntins, frames, mullions, etc.) in excess of L/175 at both a positive and a negative load of 15 psf (design wind pressure) when tested in accordance with ASTM E 330.
4. Uniform Load Structural Test:
    a. Unit to be tested at 1.5 x design wind pressure both positive and negative, acting normal to the plane of the wall in accordance with ASTM E 330.
    b. No glass breakage, permanent damage to fasteners, hardware parts, or permanent deformation of any main frame section in excess of 0.2 percent of its span.
5. Vertical Concentrated Load on Intermediate Frame Rails: Deflection at point of load application maximum 0.062 inch.
6. Condensation Resistance Factor Test: When performed in accordance with AAMA 1502.7, condensation resistance factors (CFR) minimum 50 (glass CRF), 54 (frame CRF).
7. Thermal Test ([U] Value@: When performed in accordance with AAMA 1503.1, thermal transmittance ([U]) maximum 0.69 BTU per hour per square foot per degree F at 15-mph exterior wind velocity.

C. Design Criteria: The Drawings are based on selected types and models of aluminum windows, as provided by specific manufacturers. Equivalent types of windows by other manufacturers may be considered for substitution, providing the CONTRACTOR submits in conformance with the requirements of Section 01 25 10, and providing deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances, as judged solely by the ENGINEER.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: Alloy and temper shall be as recommended by the window manufacturer for strength, corrosion resistance, and application of the required finish, but not less than 22,000 psi ultimate tensile strength and not less than 0.062-inch thickness at any location for main frame and sash members. Comply with ASTM B 221.

B. Fasteners: Aluminum nonmagnetic stainless steel, or other materials warranted by the manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors and other components of the window units.

1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard noncorrosive pressed-in splined grommet nuts.
2. Exposed fasteners shall not be used unless absolutely required, and then shall match the finish of members and hardware being fastened.

C. Anchors, Clips and Window Accessories: Depending on the strength and corrosion-inhibiting requirements, fabricate units of aluminum, nonmagnetic stainless steel, or hot-dip zinc coated steel or iron complying with ASTM A 386.

D. Compression Glazing Strips: At manufacturer's option, provide molded neoprene gaskets complying with ASTM D 2000, Designations 2BC415 to 3BC620, molded PVC gaskets complying with ASTM D 2287, or molded expanded neoprene gaskets complying with ASTM C 509, Grade 4.

E. Sealant: Unless otherwise indicated for sealants required within fabricated window units, provide the types recommended by the window manufacturer for joint sizes and movement, to remain permanently elastic, nonshrinking and nonmigrating. Comply with requirements of Section 07 92 00 - Sealants and Caulking, for installation.

2.2 WINDOW CLASSIFICATION

A. Commercial Windows (Graded A2): Except as otherwise indicated, provide window units complying with requirements of AAMA Classification A2, for Commercial type buildings.

2.3 FABRICATION

A. General: Provide manufacturer's standard fabrication and accessories which comply with the indicated standards and are reglazable without dismantling of the sash framing, except to the extent more specific or more stringent requirements are indicated. Include complete system for assembly of components and anchorage of window units, and prepare sash for glazing except where preglazing at the factory is indicated.

B. Sizes and Profiles: The required sizes and configurations for window units and profile requirements are indicated. Variable dimensions (if any) are indicated along with maximum and minimum dimensions as required to achieve the design requirements and coordination with other Work.

C. Preglazed Fabrication: Window units may be preglazed at the factory where possible and practical for the applications indicated. Comply with the requirements of Section 08 80 00 - Glazing, in addition to the requirements of ANSI/AAMA 302.9.

D. Provide water-shed members at lines of natural water penetration.

E. Provide a means of drainage for water and condensation which may accumulate in members of window units.

F. Weatherstripping: Provide compression-type weatherstripping at the perimeter of each operating sash, except provide sliding weatherstripping at all locations where sash rails slide horizontally or vertically along the frame of units.

G. Provide subframes if indicated, complete with anchors for window units, of profiles and dimensions indicated but not less than 0.062-inch thickness extruded aluminum; with mitered or coped corners, welded and dressed smooth or with concealed mechanical joint fasteners; finish to match window units.

H. Provide mullions and cover plates matching window units, complete with anchors for support and installation. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections.

2.4 ALUMINUM WINDOW FINISHES

A. Provide manufacturer's standard acrylic or polyester, baked-on electrostatically applied enamel coating of 1.5-mil dry film thickness, color: dark bronze; applied over manufacturer's standard substrate preparation including chromate conversion coating.

2.5 MANUFACTURER, OR EQUAL

A. Drawings are based on Wausau, Series 410i (single slide window units); Kawneer, Series NX-6400 (single sliding window units).

PART 3 - EXECUTION

3.1 MATERIALS

A. Delivery of Materials: Manufactured products shall be delivered in original unbroken packages, containers, or crating, bearing the manufacturer's label with manufacturer's name, product description, and rating.

B. Storage: All products shall be carefully stored in an area that is protected from the deleterious elements, in a manner recommended by the product's manufacturer. Storage shall be in a manner that will prevent damage to the product and its finish.

3.2 INSPECTION

A. Contractor and installer shall thoroughly examine substrates on which aluminum windows will be installed and conditions under which Work of this Section will be performed.

B. Commencing Work shall imply acceptance of existing conditions as satisfactory to successful completion of this Work.

3.3 INSTALLATION

A. Contractor shall comply with manufacturer's instructions and recommendations for installation of window units, hardware, operators, accessories, and other components of the Work.
   1. Aluminum and other corrodible surfaces shall be separated from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101.

B. Sill members and other frame members shall be set in a full bed of compound or with joint fillers or gaskets, as indicated, to provide for weathertight construction.
   1. Refer to Specification Section 07 92 00 – Joint Sealants for compounds, fillers, and gaskets to be installed concurrently with aluminum window units.
   2. Coordinate installation of aluminum windows with wall flashings and other components of Work.

C. Units shall be set plumb, level, and true to line, without warp or rack of frames or sash. Anchor securely in place.

3.4 ADJUST AND CLEAN

A. Finished surfaces of aluminum windows and related accessories shall be free from damage, flaws, blemishes or other defects detrimental to appearance. Surfaces, joints and exposed trim shall be in correct position and alignment and be uniform in plane, color, texture and finish.

B. Aluminum surfaces shall be cleaned promptly after installation of windows. Care shall be exercised to avoid damage to protective coatings and finishes. Excess glazing and sealing compounds, dirt, and other substances shall be completely removed.

C. Glass of preglazed units shall be cleaned promptly after installation of window units. Glass shall be washed and polished on both faces not more than 4 days prior to the date scheduled for final inspection. Installer shall comply with manufacturer's recommendations for final cleaning and maintenance.

3.5 PROTECTION

A. Contractor shall institute and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, aluminum window units will be without damage or deterioration at the time of substantial completion.

B. Glass shall be removed and replaced immediately when it is found to be broken, chipped, cracked, abraded, or damaged in other ways during the construction period, including natural causes, accidents, and vandalism.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware Schedule”.
2. Division 08 Section “Hollow Metal Doors and Frames”.
3. Division 08 Section “Flush Wood Doors”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.
b. Manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.
h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

D. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Twenty five years for manual surface door closer bodies.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity, unless otherwise indicated:

    a. Two Hinges: For doors with heights up to 60 inches.
    b. Three Hinges: For doors with heights 61 to 90 inches.
    c. Four Hinges: For doors with heights 91 to 120 inches.
    d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

    a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
    b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

    a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
    b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

    a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Acceptable Manufacturers:

    a. Hager Companies (HA).
    b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).

2.3 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

1. Acceptable Manufacturers:

    a. Yale Locks and Hardware (YA).

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
5. Keyway: Match Facility Standard.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Key locks to Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)

2.4 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Acceptable Manufacturers:

a. Yale Locks and Hardware (YA) – 8800FL Series.

2.5 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.6 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Acceptable Manufacturers:

a. LCN Closers (LC) - 4040 Series.
b. Sargent Manufacturing (SA) - 351 Series.

2.7 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:

    a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

6. Acceptable Manufacturers:

    a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    b. Trimco (TC).

2.8 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Acceptable Manufacturers:

    a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    b. Trimco (TC).

2.9 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Acceptable Manufacturers:

1. National Guard Products (NG).
2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.10 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.11 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9

Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with

corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. Manufacturer's Abbreviations:

1. MK - McKinney
2. YA - Yale
3. LC - LCN Closers
4. RO - Rockwood
5. PE - Pemko

Hardware Sets

Set: 1.0

Doors: 103A, 110A, 111A

3 Hinge	TA2314 x NRP	US32D	MK
1 Storeroom Lock	AUCN 8805FL MK	626	YA
1 Door Closer	4040XP CUSH	AL	LC
1 Threshold	271A		PE
1 Gasketing	294AV		PE
1 Sweep	57AV		PE

Set: 2.0

Doors: 112A, 117A

3 Hinge	TA2714	US26D	MK
1 Storeroom Lock	AUCN 8805FL MK	626	YA
1 Door Closer	4040XP Rw/PA	AL	LC
1 Kick Plate	K1050 10"	US32D	RO
1 Stop	406/409/441H (as required)	US32D	RO
1 Gasketing	S44BL		PE

Set: 3.0

Doors: 107A

3 Hinge	TA2714	US26D	MK
1 Entry Lock	AUCN 8807FL MK	626	YA

1 Stop	406/409/441H (as required)	US32D	RO
3 Silencer	608		RO

Set: 4.0

Doors: 102A, 102B, 105A, 107A, 114A, 115A, 116A

3 Hinge	TA2714	US26D	MK
1 Entry Lock	AUCN 8807FL MK	626	YA
1 Kick Plate	K1050 10"	US32D	RO
1 Stop	406/409/441H (as required)	US32D	RO
3 Silencer	608		RO

Set: 5.0

Doors: 104A, 109B

3 Hinge	TA2314 x NRP	US32D	MK
1 Entry Lock	AUCN 8807FL MK	626	YA
1 Door Closer	4040XP CUSH	AL	LC
1 Threshold	271A		PE
1 Gasketing	294AV		PE
1 Sweep	57AV		PE
1 Kick Plate	K1050 10"	US32D	RO
1 Stop	406/409/441H (as required)	US32D	RO

Coordinate with Owner if existing hardware can be reused.

Set: 6.0

Doors: 101A, 109A

Hardware to be reused – coordinate with owner and provide new to match existing if it needs to be replaced.
For Door 101A, provide a closer (4040XP Rw/PA, AL, LC) if not currently part of the existing door hardware

END OF SECTION 08 71 00

SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
   1. Windows.
   2. Doors.

1.3 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating glass unit that contains dehydrated air or a specified gas.

D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated glass standard.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
   a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour (meters per second) at 33 feet (10 m) above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2 Analytical Procedure," based on mean roof heights above grade indicated on Drawings. Design wind load shall be minimum 50 mph.
   b. Specified Design Snow Loads: As indicated, but not less than snow loads applicable to Project as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7.0, "Snow Loads."
   c. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
      1) Load Duration: 60 seconds or less.
   d. Probability of Breakage for Sloped Glazing: 1 lite per 1000 for lites set more than 15 degrees off vertical and under wind and snow action.
      1) Load Duration: 30 days.
   e. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch (25 mm), whichever is less.
      1) For monolithic glass lites heat treated to resist wind loads.
      2) For insulating glass.
      3) For laminated glass lites.
   f. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
   g. Thickness of Tinted and Heat Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
   1. For monolithic glass lites, properties are based on units with lites 6.0 mm thick.
   2. For laminated glass lites, properties are based on products of construction indicated.
   3. For insulating glass units, properties are based on units with lites 6.0 mm thick and a nominal 1/2 inch wide interspace.
   4. Center of Glass Values: Based on using LBL 44789 WINDOW 5.0 computer program for the following methodologies:
      a. U Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).
      b. Solar Heat Gain Coefficient: NFRC 200.
      c. Solar Optical Properties: NFRC 300.

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: For the following products, in the form of 12 inch (300 mm) square Samples for glass.
   1. Each color of tinted float glass.
   2. Each type of patterned glass.
   3. Coated vision glass.
   4. Ceramic coated spandrel glass.
   5. Each pattern and color of ceramic coated vision glass.
   6. Fire resistive glazing products.
   7. Each type of laminated glass with colored interlayer.
   8. Insulating glass for each designation indicated.
   9. For each color (except black) of exposed glazing sealant indicated.

C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
   1. For solar control low e coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

E. Qualification Data: For installers.

F. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

G. Product Test Reports: For each of the following types of glazing products:
   1. Tinted float glass.
   2. Coated float glass.
   3. Insulating glass.
   4. Glazing sealants.
   5. Glazing gaskets.

H. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float glass, coated float glass, laminated glass, and insulating glass.

C. Source Limitations for Glass Sputter Coated with Solar Control Low E Coatings: Where solar control low e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter coated solar control low e coated glass in fabricated units from a manufacturer that is certified by coated glass manufacturer.

D. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

E. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
   1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

F. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36 month period.
   1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
   2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

G. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass framing member that will contact or affect elastomeric glazing sealants:
   1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
   2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint sealant backings, secondary seals, and miscellaneous materials.
   3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.

H. Glazing for Fire Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire protection ratings indicated, based on testing according to NFPA 252.

I. Glazing for Fire Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

J. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.
1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. (0.84 sq. m) in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. (0.84 sq. m) or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

K. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: GANA Laminated Division's "Laminated Glass Design Guide" and GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG 1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB 3001, "Sloped Glazing Guidelines."
4. IGMA Publication for Insulating Glass: SIGMA TM 3000, "Glazing Guidelines for Sealed Insulating Glass Units."

L. Insulating Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
1. Insulating Glass Certification Council.

M. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.

2. Build glass mockups by installing the following kinds of glass in mockups specified in Division 8 Section "Aluminum Framed Entrances and Storefronts@ and AGlazed Aluminum Curtain Walls" to match glazing systems required for Project, including glazing methods:
    a. Heat strengthened coated glass.
    b. Fully tempered glass.
    c. Spandrel glass.
    d. Laminated glass.
    e. Coated insulating glass.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

N. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For insulating glass units that will be exposed to substantial altitude changes, comply with insulating glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

1.9 WARRANTY

A. Manufacturer's Special Warranty for Coated Glass Products: Manufacturer's standard form, made out to Owner and signed by coated glass manufacturer agreeing to replace coated glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated glass manufacturer agreeing to replace laminated glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: Five years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating glass manufacturer agreeing to replace insulating glass

units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
   2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 GLASS PRODUCTS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality Q3; of class indicated.

B. Heat Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality Q3; of class, kind, and condition indicated.
   1. Fabrication Process: By horizontal (roller hearth) process with roll wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
   2. Provide Kind HS (heat strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
   3. For uncoated glass, comply with requirements for Condition A.
   4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
   5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat strengthened) float glass where safety glass is indicated.

C. Ceramic Coated Vision Glass: Float glass with ceramic enamel applied by silk screened process and complying with ASTM C 1048, Condition C (other coated glass), Type I (transparent flat glass), Quality Q3, Specification No. 95 1 31 in GANA Tempering Division's "Engineering Standards Manual," and other requirements specified.

D. Sputter Coated Float Glass: ASTM C 1376, float glass with metallic oxide or nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.

E. Coated Spandrel Float Glass: Float glass complying with other requirements specified and with the following:
   1. Fallout Resistance: Provide spandrel units identical to those passing the fallout resistance test for spandrel glass specified in ASTM C 1048.

2. Factory apply manufacturer's standard opacifier of the following material to coated second surface of lites, with resulting products complying with Specification No. 89 1 6 in GANA Tempering Division's "Engineering Standards Manual."
    a. Manufacturer's standard opacifier material.

F. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:
1. Interlayer: Polyvinyl butyral of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
    a. For polyvinyl butyral interlayers, laminate lites in autoclave with heat plus pressure.
2. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets.

G. Insulating Glass Units, General: Factory assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating Glass Units" Article.
1. Provide Kind HS (heat strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
4. Sealing System: Dual seal, with primary and secondary sealants as follows:
    a. Polyisobutylene and hot melt butyl.
5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
    a. Spacer Material: Aluminum with mill or clear anodic finish.
    b. Desiccant: Molecular sieve or silica gel, or blend of both.
    c. Corner Construction: Manufacturer's standard corner construction.

2.3 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
1. EPDM, ASTM C 864.
2. Silicone, ASTM C 1115.
3. Thermoplastic polyolefin rubber, ASTM C 1115.
4. Any material indicated above.

B. Soft Compression Gaskets: Extruded or molded, closed cell, integral skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
1. EPDM.
2. Silicone.

3. Thermoplastic polyolefin rubber.
4. Any material indicated above.

C. Lock Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock strips, complying with ASTM C 542, black.

2.4 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:
1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
1. Single Component Neutral and Basic Curing Silicone Glazing Sealants:
a. Available Products:
1) Dow Corning Corporation; 790.
2) GE Silicones; SilPruf LM SCS2700.
3) Tremco; Spectrem 1 (Basic).
b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 100/50.
d. Use Related to Exposure: NT (nontraffic).
e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
1) Use O Glazing Substrates: Coated glass, color anodic aluminum, aluminum coated with a high performance coating, galvanized steel, and wood.
2. Neutral Curing Silicone Glazing Sealants:
a. Available Products:
1) Dow Corning Corporation; 795.
2) GE Silicones; UltraPruf II SCS2900.
3) Pecora Corporation; 865.
b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 50.
d. Use Related to Exposure: NT (nontraffic).
e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.

1) Use O Glazing Substrates: Coated glass, color anodic aluminum, aluminum coated with a high performance coating, galvanized steel, and wood.

3. Class 25 Neutral Curing Silicone Glazing Sealant:
   a. Available Products:
      1) Dow Corning Corporation; 799.
      2) GE Silicones; UltraGlaze SSG4000.
      3) Tremco; Tremsil 600.
   b. Type and Grade: S (single component) and NS (nonsag).
   c. Class: 25.
   d. Use Related to Exposure: NT (nontraffic).
   e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
      1) Use O Glazing Substrates: Coated glass, color anodic aluminum, aluminum coated with a high performance coating, galvanized steel, and wood.
4. Acid Curing Silicone Glazing Sealants:
   a. Available Products:
      1) Dow Corning Corporation; 999-A.
      2) GE Silicones; Contractors SCS1000.
      3) Pecora Corporation; 860.
      4) Tremco; Tremsil 200.
   b. Type and Grade: S (single component) and NS (nonsag).
   c. Class: 25.
   d. Use Related to Exposure: NT (nontraffic).
   e. Uses Related to Glazing Substrates: G, A, and, as applicable to glazing substrates indicated, O.
      1) Use O Glazing Substrates: Coated glass, color anodic aluminum, aluminum coated with a high performance coating, galvanized steel and wood.

2.5 GLAZING TAPES

A. Back Bedding Mastic Glazing Tapes: Preformed, butyl based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
   1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
   1. Type 1, for glazing applications in which tape acts as the primary sealant.
   2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean cut or flat grind vertical edges of butt glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.

C. Grind smooth and polish exposed glass edges and corners.

2.8 MONOLITHIC FLOAT GLASS UNITS

A. Uncoated Clear Float Glass Units: Class 1 (clear) annealed or Kind HS (heat strengthened) float glass where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with system performance requirements and Kind FT (fully tempered) float glass.
   1. Thickness: Not less than 6.0 mm.
   2. Uncoated Clear Fully Tempered Float Glass: Kind FT (fully tempered).

2.9 LAMINATED GLASS UNITS

A. Heat Treated Laminated Glass Units:
   1. Kind LHS, consisting of two lites of heat strengthened float glass.
   2. Outer Lite: Class 1 clear float glass.
      a. Kind HS (heat strengthened).
      b. Thickness: 3.0 mm.
   3. Inner Lite: Class 1 (clear) float glass.
      a. Kind HS (heat strengthened).
      b. Thickness: 3.0 mm.
   4. Plastic Interlayer:

a. Thickness: 0.060 inch (1.52 mm), but not less than that required to comply as a Type II safety glass material.
b. Interlayer Color: Clear.

2.10 INSULATING GLASS UNITS

A. Solar Control Low E Insulating Glass: **(To be installed in (2) West facing windows)** Where glass of this designation is indicated, provide low emissivity insulating glass units complying with the following:
1. Products: Available products include the following:
a. PPG SOLARBAN 70 XL SOLARGRAY.
2. Overall Unit Thickness and Thickness of Each Lite: 25 and 6 mm.
3. Interspace Content: Air.
4. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.
a. Kind HS (heat strengthened), Condition C (other coated glass).
5. Outdoor Lite: Type I (transparent glass, flat) float glass.
a. Class 2 (tinted) float glass.
1) Tint Color: SOLARGRAY
b. Kind HS (heat strengthened), Condition A (uncoated surfaces) or Kind FT (fully tempered), Condition A (uncoated surfaces).
6. Low Emissivity Coating: Sputter on third surface.
7. Visible Light Transmittance: 60%
8. Winter Nighttime U Value: 0.29
9. Summer Daytime U Value: 0.30
10. Solar Heat Gain Coefficient: 0.36
11. Outdoor Visible Reflectance: 11%
12. Shading Coefficient: 0.41.

B. Ceramic Coated Spandrel Insulating Glass: Where glass of this designation is indicated, provide insulating glass units complying with the following:
1. Products: Available products include the following:
a. Match adjacent glazing panels.
2. Construction: Provide units that comply with requirements specified for insulating glass units except for indoor lite.
3. Indoor Lite: Ceramic coated spandrel glass.
1) Kind HS (heat strengthened) or Kind FT (fully tempered).
2) Ceramic Coating Location: Fourth surface.
3) Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:
1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.

4. Effective sealing between joints of glass framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant substrate testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm) as follows:
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8 inch (3 mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Where wedge shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant where indicated.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK STRIP GASKET GLAZING

A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system, unless otherwise indicated.

3.8 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

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DIVISION 09
FINISHES

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Grid suspension systems for gypsum board ceilings.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

B. Evaluation Reports: For embossed steel studs and tracks from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft. (239 Pa).

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40 (Z120) hot-dip galvanized unless otherwise indicated.

B. Studs and Tracks: ASTM C 645. Use either steel studs and tracks or embossed steel studs and tracks.

1. Steel Studs and Tracks:

a. Basis of Design: SCAFCO, Steel Stud Company, or equal
b. Minimum Base-Metal Thickness: As required by performance requirements for horizontal deflection.
c. Depth: As indicated on Drawings.

2. Embossed Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally equivalent to conventional ASTM C 645 steel studs and tracks.

a. Basis of Design: ProSTUD Drywall Framing System by Clark Dietrich Building Systems or equal.
b. Minimum Base-Metal Thickness: As required by horizontal deflection performance requirements.
c. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide the following:

1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch (38-mm) minimum vertical movement.

2. Single Long-Leg Track System: ASTM C 645 top track with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.

D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
   1. Minimum Base-Metal Thickness: As indicated on Drawings.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:

1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES **AC01** as appropriate for the substrate.

   a. Uses: Securing hangers to structure.
   b. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.

2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

D. Furring Channels (Furring Members):
   1. Steel Studs and Tracks: ASTM C 645.

      a. Minimum Base-Metal Thickness: As indicated on Drawings.
      b. Depth: As indicated on Drawings.

   2. Embossed Steel Studs and Tracks: ASTM C 645.

      a. Minimum Base-Metal Thickness: As indicated on Drawings.

b. Depth: As indicated on Drawings.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

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

3.2 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

3.4 INSTALLING CEILING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches (1219 mm) o.c.
2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

SECTION 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall provide gypsum wallboard, complete, and in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Federal Specifications

QQ-W-461H	Wire, Steel, Carbon (Round, Bare, and Coated)

B. Commercial Standards

ASTM C 11	Terminology Relating to Gypsum and Related Building Materials and Systems
ASTM C 36	Specification for Gypsum Wallboard
ASTM C 208	Specification for Cellulosic Fiber Insulating Board
ASTM C 475	Specifications for Joint Compound and Joint Tape for Finishing Gypsum Board
ASTM C 514	Specification for Nails for the Application of Gypsum Board
ASTM C 630	Specification for Water-Resistant Gypsum Backing Board
ASTM C 754	Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board
ASTM C 1002	Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases
ASTM D 2626	Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing
ASTM E 90	Method for Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions
ASTM E 119	Method for Fire Tests of Building Construction and Materials
ASTM E 413	Classification for Rating Sound Insulation

C. Trade Standards

GA-201	(Gypsum Association) Using Gypsum Board for Walls and Ceilings
GA-214	(Gypsum Association) Recommended Specifications: Levels of Gypsum Board Finish
GA-216	(Gypsum Association) Recommended Specifications for the Application and Finishing of Gypsum Board
GA-290	(Gypsum Association) Area Separation Walls.
GA-505	(Gypsum Association) Glossary of Terminology
GA-530	(Gypsum Association) Design Data - Gypsum Products
GA-600	(Gypsum Association) Fire Resistance Manual
GA-801	(Gypsum Association) Handling Gypsum Board

1.3 CONTRACTOR SUBMITTALS

A. General: Provide the following submittals in accordance with the requirements in Section 01 33 20] - Contractor Submittals.

B. Product Data: Submit Manufacturer's technical data, product specifications, standard details, certified product test results, installation instructions and general recommendations, as may be required to show compliance with these Specifications.

C. [Samples: Submit samples, minimum 12 inches long, of actual trim and furring components.]

1.4 QUALITY ASSURANCE

A. Manufacturers' Standards: The gypsum board products and their installation shall be in accordance with the Manufacturers published recommendations and specifications and recommendations and specifications of the Gypsum Association. In the event of conflicts, the more stringent requirement shall apply.

B. Gypsum Board Construction Terminology: Refer to ASTM C 11, Gypsum Association publication GA-505 for definitions of terms related to gypsum board assemblies not defined in this Section or in other referenced standards.

C. Fire-Test-Response Characteristics: Where fire-rated gypsum board assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction. Fire resistance ratings shall be as indicated by reference to file numbers in Gypsum Association, (GA), publication GA-600, or to design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

D. Sound Transmission Characteristics: For gypsum board assemblies indicated to have STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing agency.

E. Single-Source Responsibility for Steel Framing: Steel-framing members for gypsum board assemblies shall be obtained from a single manufacturer.

F. Single-Source Responsibility for Panel Products: Each type of gypsum board and other panel products shall be obtained from a single manufacturer.

G. Single-Source Responsibility for Finishing Materials: Finishing materials shall be obtained from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to the gypsum board manufacturer.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD

A. General: All gypsum wall board shall be fire-rated, conforming to ASTM C 36, unless otherwise indicated.

B. Gypsum Wall Board: All gypsum wall board shall be 5/8 inch thick and provided with tapered edges unless otherwise indicated.
   1. Water-resistant gypsum board shall conform to ASTM C 630 with tapered edges, type "x".
   2. Ceramic tile backing board shall be a Portland cement slurry, reinforced with fiber glass mesh and coated vinyl board. The board shall be not less than 1/2 inch thick and shall be designed for use behind ceramic tile. Tile backing board shall be United States Gypsum's "Durock Board"; Laticrete International's "Latipanel"; or equal.
   3. Sound deadening board shall conform to ASTM C 208 (wood fiber) Class A.
   4. Foil backed gypsum board shall conform to ASTM C 36, Type "x", with foil laminated to back surface.

C. Manufacturers, or Equal:
   1. Georgia-Pacific Corporation.
   2. Gold Bond Building Products.
   3. United States Gypsum Co.

2.2 JOINT TREATMENT MATERIALS

A. General: Joint reinforcing tape and joint compound shall conform to ASTM C 475 and shall be of the type recommended by the manufacturer for the application indicated.

B. Joint Tape: Tape shall be paper reinforcing tape of the type recommended by the Manufacturer for the application indicated.

C. Joint Compound: On interior work, compound shall be a chemical-hardening type for bedding and filling, and a ready-mixed vinyl type for topping.

D. Exterior Joint Compound: On exterior work, compound shall be a special chemical-hardening type formulated for exterior application.

E. Water-Resistant Joint Compound: Compound for water-resistant application shall be a special water-resistant type for treatment of joints, fastener heads and cut edges of water resistant backing board. Water-resistant joint compound shall be Sheetrock Brand W/R Compound, as manufactured by United States Gypsum Co., or approved equal.

2.3 FASTENERS

A. Nails shall conform to ASTM C 514 and shall be of the length recommended by the Gypsum Association referenced standards and the Building Code for various gypsum board thicknesses.

B. Screws shall conform to ASTM C 1002, and shall be self-drilling, self-tapping, bugle head, for use with power tools, length as recommended by Gypsum Association referenced standards and the Building Code.
   1. Type "S" for wallboard to sheet metal application.
   2. Type "W" for wallboard to wood application.
   3. Type "G" for wallboard to wallboard application.
   4. Type "S" or "S-12", 1-1/4-inch for tile backing board to metal studs application.

C. Resilient channels shall be metal channels design for use with sound wall construction. They shall be as recommended and approved by the gypsum board Manufacturer and code.

2.4 ADHESIVES

A. Adhesives for fastening gypsum board to gypsum board shall be in accordance with the printed recommendations of the gypsum board Manufacturer.

2.5 ACCESSORIES

A. Metal trim, corner beads, edge, casing beads, and accessories shall be manufactured from galvanized sheet steel unless otherwise indicated and shall be Manufacturer's standard products. Special shapes shall be provided where indicated.

2.6 ACCESS PANELS

A. Access panels shall be provided where shown and/or where required for access to valves and equipment. Access panels shall be MILCOR "Type DW"; BOICE "Type C"; or equal, for flush installation. Cylinder locks shall be provided where indicated.

B. In fire-rated construction, both wall and ceiling access panels shall have a fire rating equivalent to that of the assemblies within which they are installed.

2.7 WATERPROOF MEMBRANE

A. Waterproof membrane shall be asphaltic saturated 43-pound (vapor-retarder) membrane conforming to ASTM D 2626 Type 1, 25 pounds per 100 square foot minimum or 10-mil polyethylene film membrane.

PART 3 - EXECUTION

3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Manufactured materials shall be delivered in original unbroken packages, containers, or bundles bearing the Manufacturer's label with manufacturer's name and product description and rating.

B. Storage: All materials shall be carefully stored in an area which is protected from the elements, and in a manner recommended by the referenced standards. Storage shall be in a manner that will prevent damage to the material and its finish.

C. Handling: Gypsum board shall be handled in conformance with Gypsum Association Publication 801 so as to prevent damage to edges, ends, and surfaces. Metal corner beads and trim shall not be bent or otherwise damaged.

3.2 PROJECT CONDITIONS

A. Environmental Requirements, General: The Contractor shall comply with requirements of the referenced gypsum board application standards, and recommendations for the gypsum board manufacturer, for environmental conditions before, during and after application of gypsum board.

B. Ventilation: The Contractor shall ventilate building spaces as required to remove moisture in excess of that required for drying of joint treatment materials, immediately after their application. Drafts shall be avoided during dry, hot weather to prevent too rapid drying.

3.3 PREPARATION FOR METAL SUPPORT SYSTEMS

A. [Ceiling Anchorages: The Contractor shall coordinate Work of this Section with structural ceiling work to ensure that inserts and other structural anchorage provisions have been installed to receive ceiling hangers. Inserts, hanger clips and similar devices shall be furnished to other trades for installation at times appropriate for proper coordination with other work.]

3.4 INSTALLATION OF METAL SUPPORT SYSTEMS

A. General
   1. Installation of metal supports and framing shall conform to standards established in ASTM C 754.
   2. Support system framing shall not bridge building expansion joints. Both sides of joints shall be framed with furring and other support as indicated.
   3. Nail or screw furring members to subframing as indicated.

B. Ceiling Support Suspension
   1. Hangers shall be secured to structural support by connecting directly to structure where possible. Otherwise, hangers shall be connected to inserts, clips or other anchorage devices or fasteners as indicated.
   2. Main runners shall be spaced 4 feet on center and hangers shall be spaced no more than 4 feet on center along runners, unless otherwise indicated. Main runners shall

be leveled to a tolerance of 1/4 inch in 12 feet, measured both lengthwise on each runner and transversely between parallel runners.

3. Furring members shall be spaced 16 inches on center and wire tied or clipped to main runners and to other structural supports as indicated.
4. Where direct-hung support is indicated, perimeter wall track or angle shall be attached wherever the support system meets vertical surfaces. Support members shall be mechanically joined to each other and butt-cut to fit into wall track.
5. Auxiliary framing shall be installed at terminations of gypsum board ceilings and at openings for light fixtures and similar work, and as may be required for support of both the ceiling construction and other work which is indicated to be supported by the ceiling.
6. For exterior soffits, cross-bracing and additional framing shall be provided as indicated or as may be required to resist wind uplift.
7. Seismic Restraint Systems: The ceiling support system shall be provided with horizontal and vertical (uplift) seismic restraint systems conforming to applicable code requirements and approved by local authorities having jurisdiction. Locations and spacing shall conform to applicable code requirements.
8. Horizontal Restraint: Horizontal restraints shall be provided in the form of four, no. 12-gauge diagonal bracing wires, secured to the main ceiling support members, within 2 inches of intersections with secondary supports. Bracing wires shall be splayed at 90 degrees from each other at an angle not exceeding 45 degrees from the plane of the ceiling. These horizontal restraint points shall be placed not more than 12 feet on center in both directions with the first point no more than 4 feet from each bounding wall. Restraint wire attachment to the supporting structure shall be adequate for the loads imposed. Side wall ties shall be provided where necessary.
9. Vertical Restraint: Vertical restraints shall be provided to resist seismic uplift movements. Restraints shall be telescoping, compressive posts or vertical metal struts attached to the main ceiling support members and secured to the underside of the structure above, in conformance with code requirements. Vertical restraints shall be located at each horizontal restraint and at additional locations as may be required by code.

C. Partition Support Framing

1. Supplementary framing, blocking and bracing shall be installed at terminations in the Work and where necessary for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar work, in compliance with details indicated or if not otherwise indicated, in compliance with applicable published recommendations of the gypsum board manufacturer.
2. Stud support system shall be isolated from transfer of structural loading to the system, both horizontally and vertically. Slip or cushion type joints shall be provided to attain lateral support while avoiding axial loading.
3. Runner tracks shall be installed at floors, ceilings and structural walls and columns where gypsum drywall stud system abuts other work, unless otherwise indicated.
4. Partition stud system shall be [extended through the acoustical ceilings to the structural support and substrate above the ceiling] [terminated at ceilings, except where indicated otherwise].
5. Metal studs shall be spaced at [16] [24] inches on center unless otherwise indicated.
6. Door openings shall be framed in compliance with details indicated or if not otherwise indicated, in compliance with applicable published recommendations of

the gypsum board manufacturer. Vertical studs shall be attached to jambs with screws either directly to the frames or to jamb anchor clips on the door frames. Runner track for jack studs shall be installed at the head and secured to the jamb studs on each side.

7. Openings other that door openings shall be framed in compliance with details indicated or if not otherwise indicated, in compliance with applicable published recommendations of the gypsum board manufacturer. Framing above and below openings shall be installed with runner track and jack studs, similar framing required above door heads.
8. Wall furring members shall be spaced [16] [24] inches on center, unless otherwise indicated.]

3.5 GENERAL GYPSUM BOARD INSTALLATION REQUIREMENTS

A. Application and finishing of gypsum wallboard shall conform to ASTM C 840, Gypsum Association publication 216, and manufacturer's printed recommendations.

B. Exposed end-butt joints of adjacent gypsum board panels shall be located as far from the center of walls and ceilings as possible, and staggered not less than one foot in alternate courses of board.

C. Ceiling boards shall be installed before wall boards. Ceiling boards shall be installed in a direction and manner which will minimize the number of end-butt joints, and which will avoid end joints in the central area of the ceiling. End-butt joints shall be staggered at least one foot between adjacent panel rows.

D. Gypsum board wall panels shall be installed vertically to avoid end-butt joints wherever possible. At stairwells and similar high walls, boards may be installed horizontally with end joints staggered over studs.

E. Exposed gypsum board shall be installed with face side out. Imperfect, damaged or damp boards shall not be installed. Boards shall be butted together for a light contact at edges and ends, with not more than 1/16-inch open space between boards. Boards shall not be forced into place.

F. Either edge or end joints shall be located over supports, except in horizontal applications or where intermediate support or gypsum board back-blocking is provided behind end joints. Boards shall be positioned so that like edges abut; tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field-cut ends. Tapered edges shall not be placed against cut edges or ends. Vertical joints shall be staggered over different studs on opposite sides of partitions.

G. Gypsum board shall be attached to all supplementary framing and blocking provided for additional support at openings and cutouts.

H. Control joints and expansion joints shall be formed with adequate space between edges of boards to receive trim accessories.

I. Both faces of stud partition framing shall be covered with gypsum board in concealed spaces above ceilings, except in chase walls which are braced internally.

J. The perimeter of non-load-bearing drywall partitions shall be isolated where they abut structural elements. A 1/4-inch space shall be provided at the interface, and a continuous J-type metal trim edge installed. The resultant joint shall be sealed with acoustical sealant.

K. Where sound-rated gypsum board construction is indicated on the Drawings, including multi-layer construction and work on resilient furring, all perimeters and all interstitial spaces of such construction shall be sealed on both sides with acoustical sealant, including such occurrences above acoustical ceilings. Sealant beads shall be positioned and applied in compliance with ASTM C 919 and the sealant manufacturer's recommendations. The intent of this requirement is the closure of all sound-flanking paths around or through the Work.]

3.6 CEILING SYSTEM FIRE RATING

A. Where a fire rating is indicated, the complete ceiling system shall meet the requirements for the rating specified or shown. The system shall conform to governing codes and shall meet UL requirements for the approved system. Light fixtures, speakers, and other recessed items in rated ceilings shall be provided with gypsum board enclosures as required for rated ceiling system.

3.7 INSTALLATION OF METAL ACCESSORIES

A. Metal edge trim shall be applied at all discontinued edges, where abutting with another material, and where indicated. Corner beads shall be applied at all exterior corners.

B. All metal accessories shall be set plumb, level, and true and shall be shimmed where necessary. The accessories shall be mitered at corners; exposed joints shall be accurately and tightly fitted. Sections shall be installed in lengths as long as practicable and splices shall be held to a minimum.

C. All accessories, trim, and beads shall be securely fastened to framing members.

3.8 EDGE SEALING

A. All cut, broken, or exposed edges of moisture-resistant gypsum board shall be sealed with a sealer recommended in the printed standards of the gypsum board manufacturer.

3.9 SURFACE FINISH

A. All gypsum board joints shall be taped, and all joints, end trim, corner beads, fastener, and other depressions shall be treated with joint and finishing compounds applied per Manufacturer's printed recommendations for three-coat work.

B. The gypsum board shall be sanded smooth, dusted, and provided with a textured roller finish coat.

C. Gypsum board behind vinyl wall covering shall be left with a sanded, flush, and smooth finish surface ready for painting.

D. Gypsum board at nonvisible locations, such as within attics, shall be finished as required for fire protection.

3.10 ATTIC SEPARATIONS

A. Gypsum board attic separations, with framing if necessary, shall be provided where indicated and shall be installed and taped in accordance with applicable building code requirements. Access doors shall be self-closing, and return air openings shall be equipped with fusible fire links and self-closures.

3.11 TILE BACKING

A. General: Tile backing board shall be installed behind all tile walls which are not indicated to have mortar set tiles. Backing board shall be installed per Manufacturer's published instructions.

B. Backing Surface Treatment: Gypsum drywall backing surfaces shall have all nails and screws recessed. Joints shall be taped and all joints, nail, and screw depressions shall be floated.

C. Finish: The finish surface shall be a sanded, dusted, and smooth finish ready for application of finish material. Joints or any other irregularities of backing surfaces shall not be visible.

D. Shower: Tile backing board at showers shall be installed over a waterproof membrane.

END OF SECTION

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SECTION 093013

CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Porcelain Floor Tile.

B. Related Sections include the following:
   1. Division 9 Section "Gypsum Board Assemblies" for water-resistant backer board installed in gypsum wallboard assemblies.

1.3 DEFINITIONS

A. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

B. Installation products: ANSI A118

C. Installation procedures ANSI 108

1.4 SUBMITTALS

A. Product Data: For each type of tile, mortar, grout, and other products specified.

B. Shop Drawings: Show locations for each type of tile and tile pattern.

C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

1.5 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
   1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

B. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

1.8 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
   1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers specified:

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
   1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.

B. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
   1. Provide Architect's selections from manufacturer's full range of colors, textures, and patterns for products of type indicated. Several colors are to be used as indicated on the drawings.

2.3 TILE PRODUCTS

A. Manufacturers:
   1. Basis of Design: Daltile; Div. of Dal-Tile International Inc.

B. Floor Tile: Diplomacy Series
   1. Nominal Size: 12 by 24 inches
   2. Style: ColorBody Porcelain Tile w/ rectified edges.
   3. Color: To be determined from full color range.

C. Floor Tile: Haut Monde Series
   1. Nominal Size: 2 by 2 inches
   2. Style: ColorBody Porcelain Tile w/ rectified edges.
   3. Color: To be determined from full color range.
   4. Location: At sloped floor around emergency eyewash / shower area only.

2.4 SETTING AND GROUTING MATERIALS

A. Use non-shrink high strength grout for ceramic tilework.

B. Manufacturers: Basis of Design: Mapei FlexColor CQ Urethane Grout

2.5 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
   1. Metal Edge Strips: Angle or L-shaped brushed aluminum or stainless steel, height to match tile and setting-bed thickness.

B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

C. Metal Trims: Provide metal strips (manufactured by Schluter) along tile edge and transitions.

2.6 MIXING MORTARS AND GROUT

A. Use epoxy based grout for floors conforming to ISO 13007 R2 and ISO 13007 RG Ensyme resistant formula, respectively. Equal to Mapei “Flex Color CQ”.

B. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

C. Add materials, water, and additives in accurate proportions.

D. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

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

3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Provide concrete substrates for tile floors installed with adhesives or thin-set mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.
1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
2. Remove protrusions, bumps, and ridges by sanding or grinding.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in brick pattern, unless otherwise indicated. Provide no more than 33% joint offset per TCNA. Lay out tile work and center tile fields in Main Lab, parallel with East and West walls and continue same pattern and layout into each adjoining space. Provide uniform joint widths, unless otherwise indicated.

F. Use crack isolation mat where poured gypsum is used for leveling – to be equal to Mapei “Aqua Defense”.

G. Grout tile to comply with requirements of the following tile installation standards:

1. For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.

3.4 WATERPROOFING INSTALLATION

A. Use bonded waterproof membrane together with fiberglass tape in corners for floors and minimum 18" up walls for wet locations.

B. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.

C. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.
   1. For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.
      a. Tile floors in wet areas.
      b. Tile floors composed of tiles 8 by 8 inches or larger.

B. Joint Widths: Install tile on floors with the following joint widths:
   1. Porcelain Floor Tile: 1/8 inch.

C. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.
   1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.

D. Cover finished work with Kraft paper for minimum 72 hours during drying.

3.6 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

   1. Remove urethane grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

3.7 FLOOR TILE INSTALLATION SCHEDULE

A. Tile Installation: Interior floor installation on concrete; Epoxy/Resin-Based Medium Set Mortar with cleavage membrane; TCNA F114 and ANSI A108.1B
   1. Tile Type: Porcelain floor tile.
   2. Medium-Set Mortar Bond Coat: Equal to: Mapei LHT (Large Heavy Tile Mortar).
   3. Grout: Urethane Grout.
   4. Joint Pattern: Brick Pattern w/ no more than 33% joint offset as per TCNA.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. The Contractor shall provide acoustical ceiling systems, including all supporting systems and appurtenant Work, complete, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Federal Specifications

SS-S-118B	Sound Controlling (Acoustical) Tiles and Panels.

B. Commercial Standards

ASTM A 641	Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
ASTM C 635	Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
ASTM C 636	Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
ASTM C 665	Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

C. Trade Standards
1. "Specification for Acoustical Tile and Lay-in Panel Ceiling Suspension Systems" by the Acoustical Material Association (AMA).
2. CISCA - Ceiling and Interior Systems Contractors Association Standards.

1.3 QUALITY ASSURANCE

A. Manufacturer: Obtain primary suspended acoustical ceiling system materials of each type required from a single manufacturer to the greatest extent possible. Secondary materials shall be provided only as recommended by the manufacturer of the primary materials.

B. Manufacturer's Qualifications: An acoustical ceiling system shall be provided which is the product of a single manufacturer who has been engaged in the successful production of the indicated system for a period of not less than five years.

C. Installer's Qualifications: Installation shall be by an installing firm that is a manufacturer licensed installer or approved in writing as an installer by the ceiling system manufacturer, with not less than five years successful experience with the indicated system, within Utah, and having a background of not less than three installations of comparable size and scope to that indicated.

D. Allowable Tolerances: Ceiling systems shall be installed in a manner capable of supporting all super-imposed loads, with maximum permissible deflection not to exceed 1/360 of span and maximum surface deviation not to exceed 1/8 inch in 12 feet (noncumulative). The ceiling system shall conform to ASTM C 635, heavy-duty classification with a minimum load carrying capacity of the main runner of 16 linear foot of span.

1.4 CONTRACTOR SUBMITTALS

A. Provide the following submittals in accordance with the requirements in Section 01 33 20- Contractor Submittals.

B. Product Data: Submit manufacturer's product specifications, standard details, and general recommendations applicable to the acoustical ceiling system.

C. Shop Drawings: Submit shop drawings which clearly indicate grid layout and all related dimensioning, junctions with other Work or ceiling finishes and mechanical and electrical items related to the acoustical ceiling system.

D. Submit manufacturer's installation instructions.

E. Submit manufacturer’s written certification and acceptance of the installer and his qualifications, along with documentation of the installer's experience background containing names, addresses, and sizes of projects with dates of completion.

1.5 SPECIAL CORRECTION OF DEFECTS REQUIREMENT

A. The Work of this Section shall be covered for a period of not less than 2 years against defects in material and Workmanship.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken packages or containers bearing the manufacturer’s label. Packages or containers shall be delivered to the site with seals unbroken.

B. Storage: All materials shall be carefully stored in an area that is protected from deleterious elements, in a manner recommended by the product manufacturer. Storage shall be in a manner that will prevent damage to the system components or marring of its finish.

PART 2 - PRODUCTS

2.1 SUSPENSION SYSTEM

A. Heavy-duty suspension system shall be provided as designed by the manufacturer to support the ceiling and partition assembly, including acoustical panels, lighting and HVAC elements.

B. Hanger and Diagonal Bracing Wires: Hanger and diagonal bracing wires shall be not lighter than 12-gauge, pre-straightened, galvanized, soft-annealed steel wire for support of the ceiling systems.

C. Compression Struts: Where required by authorities having jurisdiction, compression struts shall be Roblin Building Products Series CS or Donn Corp. Series VSA, galvanized steel.

D. Protective Coatings and Finishes: Electro-galvanized steel components shall be provided with low-gloss coatings and finishes to match acoustical panels and in conformance with Engineer approved sample. The finish shall be on all exposed portions of grid, including the reveal.

E. Perimeter Moldings: Shadow angle moldings shall be provided at perimeter. Material and finish shall match the exposed suspension components, in sizes and profiles as indicated or selected.

F. Miscellaneous Accessories: Provide all miscellaneous accessories such as splines, saddles, clips, fasteners, lateral braces and other accessories, fabricated of galvanized sheet steel. Such accessories shall be provided as may be required for a complete and fully functioning installation. Components shall be installed as necessary and as required to complete the suspension systems, provide lateral support of partitions and provide for the installation of lighting and HVAC elements.

2.2 EXPOSED GRID SYSTEM

A. Main beams shall be not less than 1-1/2-inch high by 1-inch wide, cold-rolled, electro-galvanized steel, with white baked enamel finish.

B. The exposed grid system shall be a "Heavy Duty" classified system as manufactured by National Rolling Mills, Series "G"; U.S.G. Interiors, Series "DX"; or equal.

2.3 ACOUSTICAL PANEL AND TILE MATERIALS

A. Acoustical Panels: Exposed grid system ceiling tile shall be 5/8 inch thick, angled tegular laid in a nondirectional fissured design. Ceiling tile shall be Armstrong, Minatone, Cortega, Angled Tegular Laid in, or equal.

B. Flame Spread Rating: Tiles or panels shall be mineral fiber tile or panel and shall have a Class 1, ASTM flame spread and a flame spread rating of under 25 per Federal Specifications SS-S-118B.

C. Finish: Finish shall be factory-applied white latex paint.

2.4 COMPRESSIBLE JOINT FILLER

A. Joint filler material shall be Dow Ethafoam, closed cell neoprene, polypropylene or other compatible resilient material.

2.5 CEMENT/ADHESIVE

A. Tile cement or adhesive shall conform to the printed recommendations of the tile manufacturer for bonding to concrete or other indicated surface material and shall have a fire-resistivity compatible with the ceiling system requirements.

PART 3 - EXECUTION

3.1 GENERAL

A. The acoustical ceiling system shall consist basically of continuous main beams and intersecting cross tees, joined together to form the patterns indicated, complete with acoustical ceiling tiles. The system shall be complete with all necessary components, anchors, and supports.

B. The system shall be designed so that the ceiling panels may be removed and replaced without damage, and so that main runners and cross tees can be removed or replaced without deforming the members or disturbing the balance of the grid system.

C. Suspension systems and tile Work shall be coordinated with lighting fixtures, air diffusers, speakers, smoke detectors, sprinkler heads exit signs, and other ceiling mounted features such that all installations Work together without interference.

3.2 INSPECTION

A. The installer shall thoroughly examine all substrates on which the suspended acoustical ceiling system will be installed and conditions under which Work of this Section is to be undertaken.

B. Commencing Work shall be construed as installer's acceptance of substrates, surfaces and conditions within any particular area as satisfactory to the successful completion of the installation.

3.3 SITE CONDITIONS

A. Acoustical ceiling system shall not be installed until the building is enclosed, sufficient heat is provided, dust-generating activities have terminated and overhead mechanical and electrical Work is completed, tested, and approved.

B. All wet Work such as plastering and grouting shall be completed and cured prior to commencement of installation.

C. Temperatures of 60 to 85 degrees F and humidity of not more than 70 percent shall be maintained prior to, during, and after the installation.

3.4 SCHEDULING

A. Contractor shall coordinate the spacing of hanger wires and structural members of the suspension system with applicable mechanical and electrical Work and shall verify locations and compatibility of suspension system elements with items installed within the ceiling system.

3.5 PATTERN AND SYMMETRY

A. Unless otherwise indicated, the layout scheme shall be such that all ceiling tiles are symmetrical about the centers of the rooms to provide a balanced installation with the least

number of cut tiles. The tiles shall be laid in a pattern with all edges in alignment and with all faces in a plane. There shall be no noticeable variations in the finish ceiling plane. Items located within the ceiling plane such as light fixtures, air diffusers, speakers, smoke detectors, and fire sprinklers shall be coordinated with other trades and shall be installed at the locations indicated. Whenever unsure of an installation location, obtain direction from the Engineer.

B. Nondirectional tile shall be laid so no fissure pattern direction is established.

3.6 INSTALLATION

A. Acoustical ceiling system shall be installed in accordance with the requirements of the suspension system design and the referenced standards.

B. Hanger Wires
   1. General: Wires shall be spaced not over 48 inches on center in both directions; no more than 16 SF of ceiling shall be supported by each hanger. Terminal ends of each cross runner or main runner shall be supported independent of, and within 8 inches of, a wall. Where possible, wire hangers shall be installed within 3 inches of each corner of a light fixture opening, preferably attached to main runners.
   2. Concrete Supports: Wires suspended from concrete shall be wrapped around reinforcing steel with a twist or loop and embedded at least 2 inches into concrete, or attached with an appropriate type powder driven fastener or insert.
   3. Metal Decking: Wires suspended from metal decking shall be attached by penetrating through metal deck, with twist and loop; or appropriate type powder driven fasteners.
   4. Steel Supports: Wires shall be wrapped around, or penetrated through steel, or by other acceptable methods.

C. Supplemental hangers, braces, supports and fasteners shall be provided as required for lateral bracing of the suspension system in accordance with the referenced standards and applicable codes having jurisdiction.

D. Suspension system installation shall proceed only after major above-ceiling Work is completed. The locations of hangers shall be coordinated with other Work. Installer shall ensure that hangers and carrying channels are located to accommodate fittings and units of equipment which are to be placed after the installation of the ceiling grid.

E. Interference: Where wide air conditioning ducts or similar obstructions above acoustical ceilings interfere with suspension hangers, provide independent framing below obstructions, to support the ceiling. Grid system framing shall be supported from floor or roof structure above. Framing shall not be attached to ductwork.

F. Grid system shall be suspended independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, installer shall avoid visible displacement of the longitudinal axis or face plane of adjacent members.
   1. All main runners shall be joined together by a splice clip which draws the members tightly together with bottom flanges flush. Cross tee intersections shall be joined together by interlock methods, by positioning the ends of the cross tees snugly against

the main runner and holding the cross tees in vertical alignment with bottom flanges flush. All main runner splices and cross tee intersections shall be capable of withstanding at least 100 lbs. tension or compression.

2. Main runners and cross tees which terminate at walls shall be attached to a perimeter edge molding. Edge moldings shall be installed at the intersection of acoustical ceilings and vertical surfaces, using maximum lengths, straight, true to line and level. Corners shall be mitered. Wall molding shall be securely attached to the walls at approximately 16-inch intervals.

G. Lighting fixtures shall not be supported from or on main runners or cross runners if weight of the fixture causes the total dead load to exceed the deflection capability. In such cases, fixture loads shall be supported by supplementary hangers located within 6 inches of each corner, or the fixtures shall be supported independently.

H. Fixtures shall not be installed so that the main runners and cross runners will be eccentrically loaded. Where fixture installation would produce rotation of runners, stabilizer bars shall be provided.

I. Acoustic units shall be fit in place, free from damaged edges or corners or other defects detrimental to appearance and function. Directionally patterned units shall be laid one-way, with pattern as directed. Border units shall be fit neatly against abutting surfaces.

J. Units shall be installed level, in uniform plane and free from twist, warp and dents.

K. Hold-down clips shall be installed on all acoustical units to hold them tight to grid system where within 20 feet of an exterior door.

3.7 SEISMIC RESTRAINT SYSTEMS

A. General: The ceiling support system shall be provided with horizontal and vertical (uplift) seismic restraint systems conforming to applicable code requirements and approved by local authorities having jurisdiction. Locations and spacing shall conform to UBC Standard 47-18 and any other applicable code requirements.

B. Horizontal Restraint: Horizontal restraints shall be provided in the form of four, No. 12-gauge diagonal bracing wires, secured to the main ceiling support members, within 2 inches of intersections with secondary supports. Bracing wires shall be splayed at 90 degrees from each other at an angle not exceeding 45 degrees from the plane of the ceiling. These horizontal restraint points shall be placed not more than 12 feet on center in both directions with the first point no more than 4 feet from each bounding wall. Restraint wire attachment to the supporting structure shall be adequate for the loads imposed. Side wall ties shall be provided where necessary.

C. Vertical Restraint: Vertical restraints shall be provided to resist seismic uplift movements. Restraints shall be telescoping, compressive posts or vertical metal struts attached to the main ceiling support members and secured to the underside of the structure above, in conformance with code requirements. Vertical restraints shall be located at each horizontal restraint and at additional locations as may be required by code.

3.8 PROBLEM AREAS

A. Manufacturer's published recommendations and specifications shall be followed for installation, materials, and treatment of problem areas; provided, that the manufacturer's published recommendations and specifications are not less than those required by "Specification for Acoustical Tile and Lay-In Panel Ceiling Suspension Systems" of the Acoustical Materials Association, and the Building Code.

3.9 FIRE-RATING

A. Where a fire rating is indicated, the complete ceiling assembly shall meet the requirements for the rating.

3.10 ADJUSTMENTS

A. Installer shall adjust any sags or twists which develop in the ceiling systems.

3.11 WORKMANSHIP

A. Levels of quality in Workmanship shall comply with the requirements of the referenced standards.

B. The finished surfaces shall be free from damage, flaws, blemishes or other defects detrimental to appearance; have joints and exposed grid in required pattern, position and alignment and be uniform in plane, color, texture and finish.

3.12 EXTRA MATERIAL

A. At completion of the Project, furnish not less than 2 percent of the total installed quantity, or fraction thereof, for each type, color, pattern and size of ceiling panel installed. Materials shall be furnished from the same manufactured lot of ceiling panels as those which are installed. Materials shall be enclosed in protective packaging with appropriate identifying labels.

END OF SECTION

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SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Vinyl base.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches (300 mm) long.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches (300 mm) long.

E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 VINYL BASE

A. Manufacturers:
1. Armstrong
2. Johnsonite
3. Roppe

B. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic).

1. Group: I - solid, homogeneous.
2. Style and Location:

    a. Style A, Straight: Provide in areas with carpet.
    b. Style B, Cove: Provide in areas with tile floor coverings.

C. Minimum Thickness: 0.125 inch (3.2 mm).

D. Height: 4 inches (102 mm).

E. Lengths: Cut lengths 48 inches (1219 mm) long Coils in manufacturer's standard length.

F. Outside Corners: Job formed.

G. Inside Corners: Job formed.

H. Colors and Patterns: Match Architect's sample.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

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

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.

a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.

a. Miter or cope corners to minimize open joints.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION

SECTION 09 68 13

TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes modular carpet tile.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for removing existing floor coverings.
2. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Shop Drawings: For carpet tile installation, plans showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.

2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of edge, transition, and other accessory strips.
9. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

D. Samples for Initial Selection: For each type of carpet tile.

1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.

E. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

F. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

G. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups at locations and in sizes shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI's "CRI Carpet Installation Standard."

1.10 DELIVERY, STORAGE, AND HANDLING

A. Comply with the following performance requirements:

- Radiant Panel: ASTM E648: >.45 watts/sq. cm: Class 1
- Smoke Density: ASTM E662: 450 Flaming Mode - Maximum
- Static Generation: AATCC 134: 3.5 KV - Maximum
- Lightfastness: AATCC 16E: Min 4.0 at 40 hrs.
- Crocking: AATCC 165: 4.0 – Wet/Dry
- Cold Water Bleed: AATCC 107: 3.0 - Minimum
- Ozone Fade: AATCC 129: 3.0 - Minimum
- Soil Protection: AATCC 189: 500 PPM Min.
- CRI Green Label Plus Air Quality Certification: Pass
- CRI Appearance Retention Rating 3.0 minimum – Heavy Traffic
  3.5 minimum – Severe Traffic
- Aachen Test: ISO 2551 Less than .15% shrinkage or growth

- Stain protection: AATCC 175: Equal to or greater than 8.0 on Red 40 stain test.

1.11 FIELD CONDITIONS

A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.12 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, the following:

a. More than 10 percent edge raveling, snags, and runs.
b. Dimensional instability.
c. Excess static discharge.
d. Loss of tuft-bind strength.
e. Loss of face fiber.
f. Delamination.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Basis of Design: Mohawk Places & Spaces III collection or approved equal.

B. Color: 546 Las Vegas

C. Style Name: Glaze II Carpet Tile GT165

D. Construction: Tufted

E. Surface Texture: Textured Patterned Cut and Loop.

F. Size: 24” x 24”.

G. Fiber Type: Duracolor Premium Nylon.

H. Dye Method: Solution Dyed / Yarn Dyed.

I. Backing Material/Composition: Primary (Reinforced Synthetic – Non Woven); Secondary Backing Layer (Thermoplastic Polymer).

J. Backing System: EcoFlex NXT

K. Density: 7,200.

L. Weight Density: 144,000.

M. Pile Thickness: .100 (2.54 mm).

N. Stitches per inch: 11.0 (43.34 per 10 cm).

O. Gage: 1/12 (47.00 rows per 10 cm).

P. Face Weight: 20.0 oz per sq. yd. for finished carpet tile.

Q. Size: 24 by 24 inches (610 by 610 mm).

R. Installation Method: Quarter Turn.

S. Indoor Air Quality: CRI Green Label Plus GLP1171.

T. Applied Treatments:

1. Soil-Resistance Treatment: Manufacturer's standard treatment.
2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:

    a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

U. Performance Characteristics:

1. Appearance Retention Rating: Moderate traffic, 2.5 minimum according to ASTM D7330.

2. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
3. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D2646.
4. Tuft Bind: Not less than 3 lbf (13 N) according to ASTM D1335.
5. Delamination: Not less than 3.5 lbf/in. (0.6 N/mm) according to ASTM D3936.
6. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.
7. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
8. Noise Reduction Coefficient (NRC): According to ASTM C423.
9. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
10. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) according to AATCC 16, Option E.
11. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

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

3.2 PREPARATION

A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Maintain pile-direction patterns indicated above.

E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

H. Install pattern parallel to walls and borders.

I. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

SECTION 09 90 00

PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and field painting of the following:
   1. Exposed interior items and surfaces.

B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
   1. Prefinished items include the following factory-finished components:
      a. Architectural woodwork and casework.
      b. Light fixtures.
   2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
      a. Furred areas.
      b. Ceiling plenums.
      c. Pipe spaces.
      d. Duct shafts.
   3. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 SUBMITTALS

A. Product Data: For each paint system specified. Include primers.
   1. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.

B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
   1. Product name or title of material.
   2. Application instructions.
   3. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
   1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.

1.7 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.
   1. Quantity: Furnish the Owner with an additional 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.

1. Benjamin Moore & Co. (Moore).
2. Glidden Co. (The) (Glidden).
3. ICI Dulux Paint Centers (ICI Dulux Paints).
4. PPG Industries, Inc. (PPG).
5. Pratt & Lambert, Inc. (P & L).
6. Sherwin-Williams Co. (S-W).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

C. Colors: Provide color selections made by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
   1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
   2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
   1. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
   2. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
   3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
   1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
   2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
   3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
   1. Paint colors, surface treatments, and finishes are indicated in the schedules.
   2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
   3. Provide finish coats that are compatible with primers used.
   4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
   5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   6. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.

7. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
   2. Omit primer on metal surfaces that have been shop primed and touchup painted.
   3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
   4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
   1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
   1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 INTERIOR PAINT SCHEDULE

A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces or a comparable one from one of the approved manufacturers:

1. Satin Finish — Low Odor Zero VOC System

Primer: ProMar 200 Zero VOC Interior Latex Primer, B28W2600 0 g/L VOC
1st coat: ProMar 200 Zero VOC Eg-Shel B26-2600 series, 0 g/L VOC
2nd coat: ProMar 200 Zero VOC Eg-Shel B26-2600 series, 0 g/L VOC

2. Semi-Gloss Finish - Water-Based Epoxy System

Primer: ProMar 200 Zero VOC Primer, B28W2600, 0 g/L VOC
1st coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 series, <150 g/L VOC
2nd coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 series, <150 g/L VOC

B. Non-Ferrous Metal & Ferrous Metal (Doors, Frames and Miscellaneous Metals): Provide the following finish systems over new, interior wood surfaces or a comparable one from one of the approved manufacturers:

1. Semi-Gloss Finish

Primer: Pro Industrial Pro-Cryl Universal Primer, B66-310 series, <100 g/L VOC
1st coat: Pro Industrial Zero VOC Acrylic Semi-Gloss, B66-650 series, 0 g/L VOC
2nd coat: Pro Industrial Zero VOC Acrylic Semi-Gloss, B66-650 series, 0 g/L VOC

C. Galvanized Metal Decking & Ferrous Decking — Including Bar Joists: Provide the following finish systems over new, interior wood surfaces or a comparable one from one of the approved manufacturers:

1. Flat, Egg-Shell

Primer: Pro Industrial Pro-Cryl Universal Primer, B66-310 series, <100 g/L VOC
1st coat: Low VOC Waterborne Acrylic Dryfall, Flat B42W81, Eg-Shel B42W82, Semi-Gloss, B42W83,
All sheens <50 g/L VOC

2nd coat: Low VOC Waterborne Acrylic Dryfall, Flat B42W81, Eg-Shel B42W82, Semi-Gloss, B42W83,
All sheens <50 g/L VOC

END OF SECTION

SECTION 09 93 00

STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and application of wood stains and transparent finishes.

1. Exterior Substrates:

a. Exposed wood soffits.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

D. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

E. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of product.

C. Samples for Verification: For each type of finish system and in each color and gloss of finish required.

1. Submit Samples on representative samples of actual wood substrates, 8 inches (200 mm) square or 8 inches (200 mm) long.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures less than 5 deg F (3 deg C) above the dew point, or to damp or wet surfaces.

C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Approved:
1. Behr
2. Cabot
3. Minwax
4. Varathane

2.2 MATERIALS, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. Stain Colors: Basis of Design: Match existing. Provide manufacturer's full color range for Architect/Owner selection.

2.3 SOURCE QUALITY CONTROL

A. Testing of Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample wood finishing materials. Contractor will be notified in advance and may be present when samples are taken. If materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying wood finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces before refinishing with complying materials if the two finishes are incompatible or produce results that, in the opinion of the Architect, are aesthetically unacceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with finish application only after unsatisfactory conditions have been corrected.

1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.

1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.

1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

D. Exterior Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Prime edges, ends, faces, undersides, and backsides of wood.

    a. For solid hide stained wood, stain edges and ends after priming.
    b. For varnish-coated stained wood, stain edges and ends and prime with varnish. Prime undersides and backsides with varnish.

3. Countersink steel nails, if used, and fill with putty or plastic wood filler tinted to final color. Sand smooth when dried.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for finish and substrate indicated.
2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 EXTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Wood Substrates: Exposed soffits.

1. Solid-Color, Water-Based Stain System:

    a. Prime Coat: Primer, alkyd for exterior wood.

    b. Intermediate Coat: Stain, exterior, water based, solid hide, matching topcoat.
    c. Topcoat: Stain, exterior, water based, solid hide.

2. Solid-Color, Solvent-Based Stain System:

    a. Prime Coat: Primer, alkyd for exterior wood.

    b. Intermediate Coat: Stain, exterior, solvent based, solid hide, matching topcoat.
    c. Topcoat: Stain, exterior, solvent based, solid hide.

3. Water-Based Semitransparent Stain System:

    a. Prime Coat: Stain, exterior, water based, semitransparent, matching topcoat.
    b. Intermediate Coat: Stain, exterior, water based, semitransparent, matching topcoat.
    c. Topcoat: Stain, exterior, water based, semitransparent.

B. Wood Substrates: Wood trim.

1. Solid-Color, Water-Based Stain System:

    a. Prime Coat: Primer, alkyd for exterior wood.

    b. Intermediate Coat: Stain, exterior, water based, solid hide, matching topcoat.
    c. Topcoat: Stain, exterior, water based, solid hide.

2. Solid-Color, Solvent-Based Stain System:

    a. Prime Coat: Primer, alkyd for exterior wood.

    b. Intermediate Coat: Stain, exterior, solvent based, solid hide, matching topcoat.
    c. Topcoat: Stain, exterior, solvent based, solid hide.

3. Water-Based Semitransparent Stain System:

    a. Prime Coat: Stain, exterior, water based, semitransparent, matching topcoat.
    b. Intermediate Coat: Stain, exterior, water based, semitransparent, matching topcoat.
    c. Topcoat: Stain, exterior, water based, semitransparent.

4. Semitransparent Stain System:

    a. Prime Coat: Stain, exterior, solvent based, semitransparent, matching topcoat.
    b. Topcoat: Stain, exterior, solvent based, semitransparent.

END OF SECTION

DIVISION 10
SPECIALTIES

SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. This Section includes the following types of signs:
   1. Panel signs.
      a. Interior room identification signs.
      b. Handicap accessibility signage.
      c. Maximum occupancy load signs.

1.2 CONTRACTOR SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

C. Shop drawings showing fabrication and erection of signs. Include plans, elevations, and large scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.
   1. Provide message list for each sign required, including large scale details of wording and lettering layout.
   2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
   3. Templates: Furnish full size spacing templates for individually mounted dimensional letters and numbers.
   4. Furnish full size layouts for metal plaques.

D. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.
   1. Samples for selection of color, pattern, and texture:
      a. Cast Acrylic Sheet and Plastic Laminate: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.
      b. Aluminum: Samples of each finish type and color, on 6 inch long sections of extrusions and not less than 4 inch squares of sheet or plate, showing the full range of colors available.

1.3 QUALITY ASSURANCE

A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.

B. Single Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

C. Handicapped Accessibility: Provide signs which are in conformance with the requirements of ANSI A117.1-2003 and the Americans with Disabilities Act of 1990 (ADA).

D. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated. Sign units by other manufacturers may be considered provided deviations in dimensions and profiles do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

1.4 DELIVERY AND HANDLING

A. Delivery: Provide protective covering or crating as recommended by the manufacturer to protect sign components and surfaces against damage during transportation and delivery.

B. Handle signs carefully to prevent breakage, surface abrasion, denting, soiling, and other defects. Comply with the manufacturer's written handling instructions for unloading components subject to damage.
   1. Inspect sign components for damage on delivery.
   2. Do not install damaged sign components.
   3. Repair minor damage to signs, provided the finished repair is equal in all respects to the original work and is approved by Architect; otherwise, remove and replace damaged sign components.

1.5 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

1.6 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Fiberglass Panel Sign Warranty: Submit a written warranty, signed by manufacturer, agreeing to repair or replace fiberglass panels that fail during the specified warranty period. Failures include, but are not limited to, the following:
   1. Coating degradation.
   2. Chalking.

3. Fading.
4. Fiberglass delamination or cracking.

C. Warranty Period: 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
1. Manufacturers of Panel Signs:
a. ABC Architectural Signing System.
b. ASI Sign Systems, Inc.
c. Best Manufacturing Company.
d. Spanjer Brothers, Inc.
e. Vomar Products, Inc.
2. Manufacturers of Dimensional Letters:
a. ASI Sign Systems, Inc.
b. Metal Arts.
c. Metallic Arts, Inc.
d. The Southwell Company.
e. Spanjer Brothers, Inc.
f. Vomar Products, Inc.

2.2 MATERIALS

A. Steel Tubing: Cold-formed steel tubing conforming to ASTM A 500, Grade B, hot-dip galvanized after fabrication with a minimum of 2.0 oz. of zinc/sq. ft. (610 g of zinc/sq. m) of surface area conforming to ASTM A 123.

B. Fiberglass: Molded, seamless, thermosetting, glass-fiber-reinforced polyester panels in sizes and thicknesses indicated, with a minimum tensile strength of 15,000 psi (103 MPa) when tested according to ASTM D 638 (ASTM D 638M) and with a minimum flexural strength of 30,000 psi (207 MPa) when tested according to ASTM D 790 (ASTM D 790M).

C. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested according to ASTM D 790, with a minimum allowable continuous service temperature of 176 deg F (80 deg C), and of the following general types:
1. Opaque Sheet: Where sheet material is indicated as "opaque," provide colored opaque acrylic sheet in colors and finishes as selected from the manufacturer's standards.

D. Aluminum Castings: Provide aluminum castings of alloy and temper recommended by the sign manufacturer for the casting process used and for the use and finish indicated.

2.3 PANEL SIGNS

A. General: Provide panel signs that comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
   1. Produce smooth panel sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch1.5 mm measured diagonally.

B. Basis of Design Product: ASI Sign Systems, Inc.; ASI Tactile Graphics Plaque Sign System or a comparable product of one of the following:
   1. Available Manufacturers:
      a. APCO Graphics, Inc.
      b. Best Manufacturing Co.
      c. Mohawk Sign Systems.

C. Sign Face: High impact aluminum tri-hydrate filled polyester acrylate resin, pressure molded into a single polymerized component, using manufacturers standard co-molding process.

D. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to comply with the following requirements:
   1. Edge Condition: Square cut.
   2. Corner Condition: Square.
   3. Depth: 0.25 inch thickness.
   4. Panel Appearance: As selected by Architect.
   5. Color: As selected by Architect from manufacturer=s full range of colors.
   6. Surface Texture: As selected by Architect.
   7. Letter Style: Arial.
   8. Letter Height: As scheduled.

E. Brackets: Fabricate brackets and fittings for bracket mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Background chassis shall be concealed by modules and accessories.

F. Graphic Content and Style: Provide sign copy that complies with requirements indicated in the Sign Schedule for size, style, spacing, content, mounting height and location, material, finishes, and colors of signage.
   1. Provide signage indicating handicap entry at each set of entry doors into facility.
   2. Provide one wall mounted sign per door or set of doors throughout building.
      a. Provide signs with cutouts and removable inserts (maximum of three (3) per sign) with permanent ADA text.
   3. Provide maximum occupancy load signs in assembly rooms as required by code.

G. Tactile and Braille Copy: Manufacturer's standard process for producing copy complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille. Produce precisely formed characters with square cut edges free from burrs and cut marks.
   1. Raised Copy Thickness: Not less than 1/32 inch0.8 mm.

H. Changeable Message Inserts: Fabricate signs to allow insertion of changeable messages in the form of transparent covers with paper inserts printed by Owner.

1. Furnish paper and software for creating text and symbols for IBM compatible computers for Owner production of paper inserts.
2. Furnish paper cut to size for changeable message insert.

I. Colored Coatings: For copy and background colors, provide Pantone Matching System (PMS) colored coatings, including inks and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for application intended.

J. Applied Copy: Die cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure sensitive adhesive backing. Apply copy to exposed face of panel sign, glass, doors, or wall surfaces as indicated.

2.4 FINISHES

A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

B. Bracket Mounted Units: Provide the manufacturer's standard brackets, fittings, and hardware as appropriate for mounting signs that project at right angles from walls and ceilings. Attach brackets and fittings securely to walls or ceilings with concealed fasteners and anchoring devices to comply with manufacturer's directions.

3.2 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION

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SECTION 10 28 00

LAB ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Warm-air dryers.
   2. Custodial accessories.

1.3 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
   2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
   3. Include electrical characteristics.

B. Samples: Full size, for each exposed product and for each finish specified.

   1. Approved full-size Samples will be returned and may be used in the Work.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: **15** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 LAB ACCESSORIES

A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

B. Shower Curtain:

1. Basis of Design: Haws Model 9037 Privacy curtain.

2. Size: Minimum 12 inches (305 mm) wider than curtain track by 78 inches (1828 mm) high.
3. Material: Vinyl, minimum 0.006 inch (0.15 mm) thick, opaque, matte.
4. Color: As selected from manufacturer's full range.
5. Grommets: Corrosion resistant at minimum 6 inches (152 mm) o.c. through top hem.

6. Shower Curtain Hooks: Chrome-plated or stainless-steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.
7. Provide ceiling mounted curtain track around (3) sides.

C. Warm-air Dryers

1. Basis of Design: Bobrick TrimLine Hand Dryer Model B-7128 (Stainless)
2. Description: Standard-speed, warm-air hand dryer.
3. Mounting: Surface mounted, ADA compliant.
4. Operation: **Electronic-sensor** activated with timed power cut-off switch.
5. Electrical Requirements: Coordinate w/ electrical drawings.

2.3 MATERIALS

A. Stainless Steel: ASTM A666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.

B. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.

C. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

2.4 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION

SECTION 10 44 13
FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install fire protection cabinets for the following:
   1. Portable, hand-carried fire extinguishers.

1.2 RELATED SECTIONS

A. Section 10 44 16 Fire Extinguishers

1.3 REFERENCES

A. ASTM International (ASTM) standards, most recent editions:

ASTM A666	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
ASTM A1008	Specification s for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM D4802	Standard Specification for Poly(Methyl Methacrylate) Acrylic Plastic Sheet

B. National Association of Architectural Metal Manufacturer's (NAAMM) standards, most recent editions:

AMP 500	Metal Finishes Manual

C. National Fire Protection Association (NFPA) standards, most recent editions:

NFPA 70	Standard for Electrical Safety in the Workplace and Handbook

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 20 – Submittal Procedures.

B. Product Data: Furnish for each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for cabinets.
   1. Include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

C. Shop Drawings: Furnish drawings for fire protection cabinets indicating plans, elevations, sections, details, and attachments to other Work.

D. Operation and Maintenance Data: Submit operation and maintenance data suitable for inclusion in facility operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: When such are used, listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 25 10 - Products, Materials, Equipment and Substitutions.

B. Delivery Schedule: For fire protection cabinets, coordinate final fire extinguisher cabinet schedule with fire extinguisher schedule to ensure proper fit and function.

C. Acceptance at Site: Inspect all boxes and packages upon delivery to the Project Site. Notify Architect, in writing, if any loss or damage exists to products or components. Replace loss and repair damage to new condition in accordance with manufacturer's original specifications and specific instructions.

1.7 COORDINATION

A. Coordinate type and capacity of fire protection cabinets with fire extinguishers to ensure fit and function.

B. When fire protection cabinets are to be recessed into walls, coordinate sizes and locations of cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with Contract Documents, the following manufacturers are acceptable:
   1. Fire Extinguishers:
      a. Amerex Corporation.
      b. J.L. Industries, Inc.
      c. Larsen's Manufacturing Company.
      d. Potter Roemer, LLC.

2.2 MATERIALS

A. Steel Sheet: ASTM A1008, Commercial Steel (CS), Type B.

B. Stainless Steel Sheet: ASTM A666, Type 304

C. Transparent Acrylic Sheet: ASTM D4802, Category A-1 (cell-cast sheet), 1/4 inch, with Finish 1 (smooth or polished).

2.3 FIRE PROTECTION CABINET

A. Cabinet Type: Recess mounted, suitable for fire extinguisher.

B. Cabinet Construction: Non-rated.

C. Cabinet Material: Stainless Steel sheet.

D. Trim Style: Rounded edges, stainless steel sheet.

E. Identification: Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
   1. Location: Applied to cabinet door:
   2. Application Process: Engraved or decal.
   3. Lettering Color: Black or Red.
   4. Orientation: Vertical.

F. Door Style: Vertical duo panel with frame.

G. Door Glazing: Clear transparent acrylic sheet.

H. Door Hardware
   1. Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
   2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

2.4 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
   1. Weld joints and grind smooth.
   2. Provide factory-drilled mounting holes.
   3. Prepare doors and frames to receive locks.
   4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 FINISH

A. General
   1. Comply with NAAMM's AMP 500 for applying and designating finishes.
   2. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping,
   3. Finish fire protection cabinets after assembly.

4. Notable variations in finish of same piece are not acceptable. Variations in appearance of adjoining components are acceptable if approved by Architect.

B. Stainless Steel Finishes
   1. Surface preparation: Remove tool and die marks and stretch lines.
   2. Grind and polish surfaces to produce uniform finish, free of cross scratches
      a. Directional satin finish, No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.

B. Proceed with installation only after any unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for fire protection cabinets as required by type, size, and trim style.

3.3 INSTALLATION

A. Install fire protection cabinets in locations indicated and in compliance with requirements of authorities having jurisdiction.

B. Fasten cabinets to structure, square and plumb, at locations indicated.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory finished appearance, subject to approval of Engineer. Use only materials and procedures recommended or furnished by fire protection cabinet manufacturer.

E. At direction of Engineer, replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 10 44 16
FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install portable, hand-carried fire extinguishers.

1.2 RELATED SECTIONS

A. Section 10 44 13 Fire Extinguisher Cabinets

1.3 REFERENCES

A. National Fire Protection Association (NFPA) standards, most recent editions:

NFPA 10	Portable Fire Extinguishers

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 20 – Submittal Procedures.

B. Product Data: Furnish for each type of product indicated. Include information on rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguishers.

C. Operation and Maintenance Data: Submit operation and maintenance data suitable for inclusion in facility operation and maintenance manuals.

D. Warranty Documentation: Submit sample of manufacturer's warranty.

1.5 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10.

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

C. UL Listing: Provide fire extinguishers with UL Rating as noted for each type and size.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 25 10 - Products, Materials, Equipment and Substitutions.

B. Delivery Schedule: For fire extinguishers, coordinate final fire extinguisher schedule with fire extinguisher cabinet schedule to ensure proper fit and function.

C. Acceptance at Site: Inspect all boxes and packages upon delivery to the Project Site. Notify Engineer, in writing, if any loss or damage exists to products or components. Replace loss and repair damage to new condition in accordance with manufacturer's original specifications and specific instructions.

1.7 COORDINATION

A. Coordinate type and capacity of fire extinguishers with Fire Protection Cabinets to ensure fit and function.

1.8 WARRANTY

A. Special Warranty: Provide manufacturer's stand form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within warranty period.

B. Failures include, but are not limited to, the following:
   1. Failure of hydrostatic test according to NFPA 10.
   2. Faulty operation of valves or release levers.

C. Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with Contract Documents, the following manufacturers are acceptable:
   1. Fire Extinguishers:
      a. Amerex Corporation.
      b. J.L. Industries, Inc.
      c. Larsen's Manufacturing Company.
      d. Potter Roemer, LLC.
      e. Architect approved equal.

2.2 FIRE EXTINGUISHERS

A. Provide only new extinguishers of type, size, and capacity for each fire extinguisher cabinet and mounting bracket indicated.

B. Multipurpose Dry-Chemical in Steel Container: UL-rated 4A:80-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

C. Valves: Manufacturer's standard.

D. Handles and Levers: Manufacturer's standard.

E. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Provide manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine surfaces, areas, and finishes for compliance with conditions affecting fire extinguisher mounting.

B. Preinstalling Testing: Examine fire extinguishers for proper charging and tagging.
   1. Remove and replace damaged, defective, or undercharged fire extinguishers

C. Proceed with installation only after any unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION

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DIVISION 12
FURNISHINGS

SECTION 12 21 13
HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of venetian blinds and accessories:
   1. Miniblinds with aluminum louver slats.
   2. Horizontal blinds for all exterior windows. Blinds are not required at the storefront entries to the building.

B. Horizontal louver blinds will be required in every window of the Administration and Maintenance Buildings, unless otherwise specified on the Drawings.

C. Related Sections include the following:
   1. Division 6 Section "Miscellaneous Carpentry" for wood blocking and grounds for mounting horizontal louver blinds and accessories.

1.2 DEFINITIONS

A. Miniblind: Venetian blind with nominal 1 inch (25 mm) wide louver slat.

1.3 CONTRACTOR SUBMITTALS

A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.

B. Shop Drawings: Show location and extent of horizontal louver blinds. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other Work, operational clearances, and relationship to adjoining work.

C. Samples for Selection: For each colored component of each type of horizontal louver blind indicated.
   1. Include similar Samples of accessories involving color selection.

D. Window Treatment Schedule: Include horizontal louver blinds in schedule using same room designations indicated on Drawings.

E. Maintenance Data: For horizontal louver blinds to include in maintenance manuals. Include the following:
   1. Methods for maintaining horizontal louver blinds and finishes.
   2. Precautions about cleaning materials and methods that could be detrimental to finishes and performance.
   3. Operating hardware.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain horizontal louver blinds through one source from a single manufacturer.

B. Fire Test Response Characteristics: Provide horizontal louver blinds with the fire test response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
   1. Flame Resistance Ratings: Passes NFPA 701.

C. Corded Window Covering Product Standard: Provide horizontal louver blinds complying with WCMA A 100.1.

D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
   1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver blinds in factory packages, marked with manufacturer and product name, and location of installation using same room designations indicated on Drawings and in a window treatment schedule.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Horizontal Louver Blinds: Before installation begins, for each size, color, texture, pattern, and gloss indicated, full size units equal to 5 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Horizontal Louver Blinds, Aluminum Louver Slats:
      a. Hunter Douglas Window Fashions.
      b. Levolor Contract; a Newell Company; Levolor.
      c. Springs Window Fashions Division, Inc.; Bali.

2.2 HORIZONTAL LOUVER BLINDS, ALUMINUM LOUVER SLATS

A. Louver Slats: Aluminum, alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radiused corners.
   1. Nominal Slat Width: 1 inch (25 mm) for miniblinds.
      a. Slat Spacing: Every 18 mm for 16.7 slats or more per foot (18 mm).
   2. Nominal Slat Thickness: Not less than 0.008 inch (0.20 mm).
   3. Slat Finish: Colors as indicated.
      a. Ionized Coating: Antistatic, dust repellent, baked polyester finish.

B. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends; capacity for one blind per headrail, unless otherwise indicated on Drawings.

C. Bottom Rail: Formed steel or extruded aluminum tube, sealed with plastic or metal capped ends top contoured to match crowned shape of louver slat; with enclosed and protected ladders and tapes to prevent their contact with sill.

D. Maximum Light Blocking Blinds: Designed for eliminating all visible light gaps if slats are tilted closed; with tight tape spacing indicated and slats with minimal sized rout holes for ladders hidden and placed near back edge for maximum slat overlap; with headrail and bottom rail extended and formed for light tight joints between rail and adjacent slats or construction.

E. Tilt Control: Consisting of enclosed worm gear mechanism and linkage rod, for the following operation:
      a. Tilt Operation: Manual with clear plastic wand.
      b. Length of Tilt Control: Length required to make operation convenient from floor level.
      c. Tilt: Full.

F. Lift Operation: Manual, cord lock; locks pull cord to stop blind at any position in ascending or descending travel.

G. Tilt Control and Cord Lock Position: Right side and left side of headrail, respectively, unless otherwise indicated.

H. Ladders: Evenly spaced to prevent long term louver sag.

1. For Blinds with Nominal Slat Width 1 Inch (25 mm) or Less: Braided string.
    a. Tape Color, Texture, and Pattern: Color, texture, and pattern as selected by Architect from manufacturer's full range.

I. Valance: Manufacturer's standard.
    a. Finish Color Characteristics: Match color, texture, pattern, and gloss of louver slats.

J. Mounting: Wall or ceiling mounting permitting easy removal and replacement without damaging blind or adjacent surfaces and finishes; with spacers and shims required for blind placement and alignment indicated.
    1. Provide intermediate support brackets if end support spacing exceeds spacing recommended by manufacturer for weight and size of blind.

K. Hold Down Brackets and Hooks or Pins: Manufacturer's standard, as indicated.

L. Side Channels and Perimeter Seals: Manufacturer's standard for eliminating light gaps when blinds are closed.

M. Colors, Textures, Patterns, and Gloss: As selected by Architect from manufacturer's full range.

2.3 HORIZONTAL LOUVER BLINDS FABRICATION

A. Product Standard and Description: Comply with AWCMA Document 1029, unless otherwise indicated, for each horizontal louver blind designed to be self-leveling and consisting of louver slats, rails, ladders, tapes, lifting and tilting mechanisms, cord, cord lock, tilt control, and installation hardware.

B. Concealed Components: Noncorrodible or corrosion resistant coated materials.
    1. Lifting and Tilting Mechanisms: With permanently lubricated moving parts.

C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
    1. Blind Units Installed between (Inside) Jambs: Width equal to 1/4 inch (6 mm) per side or 1/2 inch (12 mm) total, plus or minus 1/8 inch (3 mm), less than jamb to jamb dimension of opening in which each blind is installed. Length equal to 1/4 inch (6 mm), plus or minus 1/8 inch (3 mm), less than head to sill dimension of opening in which each blind is installed.
    2. Blind Units Installed Outside Jambs: Width and length as indicated, with terminations between blinds of end to end installations at centerlines of mullion or other defined vertical separations between openings.

D. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting headrail and operating hardware, and for hardware position and blind mounting method indicated.

E. Installation Fasteners: Not fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

F. Color Coated Finish:
   1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

G. Component Color: Provide rails, cords, ladders, and exposed to view metal and plastic matching or coordinating with slat color, unless otherwise indicated.

PART 3 - EXECUTION

A. EXAMINATION

B. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 HORIZONTAL LOUVER BLIND INSTALLATION

A. Install blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions, and located so exterior louver edges in any position are not closer than 1 inch (25 mm) to interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware, if any.

B. Flush Mounted: At APunched@ glazed areas install blinds with louver edges flush with finish face of opening if slats are tilted open.

C. Head Mounted: At other glazed areas install headrail on face of opening head.

3.3 ADJUSTING

A. Adjust horizontal louver blinds to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean blind surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.

C. Replace damaged blinds that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION

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SECTION 12 36 61.16

EPOXY RESIN COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Epoxy Resin countertops.
2. Epoxy Resin backsplashes.

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1. Show locations and details of joints.
2. Show direction of directional pattern, if any.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification: For the following products:

1. Countertop material, 6 inches (150 mm) square.
2. Wood trim, 8 inches (200 mm) long.
3. One full-size solid surface material countertop, with front edge and backsplash, 8 by 10 inches (200 by 250 mm), of construction and in configuration specified.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For epoxy resin countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.

1. Build mockup of typical countertop as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

A. Epoxy: Factory-molded, modified epoxy-resin formulation with smooth, nonspecular finish.

1. Manufacturers:
   a. Durcon, “Durcon Resin”.
   b. Epoxy Tops: Epoxy Resin”.
   c. Prime: “Prime Resin”.
   d. Laboratory Tops: “Epoxy Resin”.

2. Type: Provide Standard type unless Special Purpose type is indicated.
3. Physical Properties:

a. Flexural Strength: 4000 psi; compressive strength - 14,000 psi; hardness, Rockwell M – 197.
b. Modulus of Elasticity: Not less than 2,000,000 psi.
c. Hardness (Rockwell M): Not less than 100.
d. Water Absorption (24 Hours): 0.05 percent.
e. Heat Distortion Point: 400 deg. F.; highly resistant to thermal shock.

4. Chemical Resistance: Epoxy-resin material has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5:
   a. No Effect: Acetic acid (98 percent), acetone, ammonium hydroxide (28 percent), benzene, carbon tetrachloride, dimethyl formamide, ethyl acetate, ethyl alcohol, ethyl ether, methyl alcohol, nitric acid (70 percent), phenol, sulfuric acid (60 percent), and toluene.
   b. Slight Effect: Chromic acid (60 percent) and sodium hydroxide (50 percent).

2.2 COUNTERTOP FABRICATION

A. Epoxy Resin:

1. Countertops consist of sheets cast from modified epoxy resin and non-asbestos inert fillers; compounded mixture cured and thermoset specifically from formulation to provide the physical and chemical resistance required in laboratory environments.
   a. Molded, modified, solid epoxy resin
   b. Formulated to produce smooth, nonabsorbent, chemical resistant, heat resistant, and shock resistant surface.
   c. Homogeneous in color and texture.
   d. Thickness: Minimum 1-inch, uniform throughout full thickness.
   e. Continuous drip groove on underside ½ inch from overhang edge.
   f. Edges: Classic Radial Surface – ¼" machined radius.
   g. Integral two-piece glued backsplash for full length of adjoining walls.
   h. Color: Black

B. Cutouts and Holes:

1. Fabricate with factory cutouts for sinks, holes for service fittings and accessories, and butt joints assembled with epoxy adhesive and concealed metal splines.

C. Sink Fabrication: Molded in one piece with smooth surfaces, coved corners, and bottom sloped to outlet; ½ inch minimum thickness.
   1. Provide with polypropylene strainers and tailpieces.
   2. Provide integral sinks in epoxy countertops, bonded to countertops with invisible joint line.
   3. Provide sinks for underside installation with manufacturer's recommended adjustable support system for table and cabinet type installations.

D. Troughs: Provide epoxy resin trough as indicated and pitch to drains not less than 1/8 inch/foot. Except where troughs empty into sinks, provide NPS 1-1/2 (DN40) outlets with

strainers and tailpieces. Molded in one piece with smooth surfaces, coved corners, ½ inch minimum thickness.

2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by epoxy resin countertop manufacturer.

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive epoxy resin countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

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

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m), 1/4 inch (6 mm) maximum. Do not exceed 1/64-inch (0.4-mm) difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Install backsplashes and end splashes per manufacturers recommendations.

END OF SECTION

DIVISION 21

FIRE SUPPRESSION

SECTION 21 13 13
FIRE SPRINKLER SYSTEM - PERFORMANCE SPECIFICATION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Fire sprinkler contractor shall provide modifications to the existing fire sprinkler system per the requirements of this performance specification, including design, submittals, and shop drawings by a NICET level 4 certified designer.

B. Remodeled and addition areas shall have the existing fire sprinkler system extended and modified to provide protection as necessary. See Architectural drawings for definition of these areas. Work includes, but is not limited to:

1. Design, drawings, and, if necessary, hydraulic calculations.
2. Materials, equipment, and devices.

    a. Pipe, fittings, hangers, seismic braces.
    b. Sprinklers, escutcheons, signs.
    c. All other materials required for complete installation.

3. Fabrication, installation, and testing.
4. Permits, fees, and documentation.
5. Health care facilities shall be provided with quick response type sprinkler heads.

1.2 RELATED WORK

A. Painting.

B. Electrical Material and Methods.

1.3 WORK NOT INCLUDED

A. Fire extinguishers and cabinets.

B. Painting.

C. Wiring of electrical and alarm devices.

1.4 SYSTEM DESCRIPTION

A. Interior - Remodeled Areas: Relocate and/or add heads as required to the existing system in order to provide coverage in the areas included in this project.

1. When modifying existing systems, relocate sprinklers as required within the parameters set forth in NFPA 13. Pipe sizing shall match the existing piping.

    a. An existing 1" outlet may be utilized to supply (1) sprinklers maximum.
    b. Mechanical tees may be utilized to run additional lines, as necessary.

        1) A flexible grooved coupling shall be installed on the new branch within 1 ft of the mechanical tee.

    c. Hangers and bracing shall be installed as required by NFPA 13 on new systems.

1.5 QUALITY ASSURANCE

A. Materials, devices, and equipment shall be Underwriters Laboratories listed or Factory Mutual approved for use in fire protection systems.

B. Designer shall be a State of Utah Registered Fire Protection Engineer or a NICET Certified Engineering Technician (Level IV).

C. Submittals and Shop Drawings shall be stamped by licensed designer.

D. Installer shall be a licensed contractor regularly engaged in the installation of fire sprinkler systems in commercial type buildings.

E. Fire sprinkler work shall comply with NFPA 13, NFPA 72, as well as the State of Utah, IFC and ADA standards.

1.6 REFERENCES

A. NFPA (National Fire Protection Association) 13, "Installation of Sprinkler Systems," current edition.

B. NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances, current edition.

C. IBC (International Building Code), 2015

D. IFC (International Fire Code), 2015.

E. Underwriters Laboratories "Fire Protection Equipment Directory," latest edition.

F. Factory Mutual Systems "Approval Guide," latest edition.

1.7 SYSTEM DESIGN

A. System shall be wet pipe.

B. Design density and area of application.

1. Mechanical, Electrical, and Janitorial: Ordinary Hazard Group 1, 0.15 GPM/SQ FT over 1,500 SQ FT.
2. Storage: Ordinary Hazard Group 2, 0.20 GPM/SQ FT over 1,500 SQ FT.
3. All other areas: Light Hazard, 0.10 GPM/SQ FT over 1,500 SQ FT.
4. Adjustments shall be made in the remote area for sloped ceilings and/or roof decks and for the use of quick response sprinkler heads throughout.

C. Maximum coverage per sprinkler head:

1. Ordinary Hazard areas: 130 SQ FT.
2. Light Hazard areas: 225 SQ FT.
3. Extended coverage sprinklers shall be allowed when installed conforming to the individual listing of the sprinkler head.

D. Vestibules: Provide dry barrel sprinklers to protect areas subject to temperatures less than 40 F.

E. The design area shall be the hydraulically most remote rectangular area having a dimension parallel to the branch line equal to, or greater than, 1.2 times the square root of the area of sprinkler operation.

F. Maximum velocity of water flow within piping: 20 FPS.

G. Flow available:

1. Contractor shall perform all necessary flow tests and calculations.
2. The contractor shall design the sprinkler system to the water supply indicated in the Engineer's Water Supply Analysis performed for the project, including all recommendations contained within the Analysis.

H. Provide head guards on any sprinklers installed below 7 ft. above the floor and in areas where the heads are subject to physical damage.

I. Sprinkler heads in areas with folding partitions, curtains, dividers, etc shall be located such that the spacing and clearance shall be maintained whether the partitions are open or closed.

1.8 SUBMITTAL

A. All shop drawings and calculations shall bear the Nicet number and signature of the responsible Nicet Certified Technician or the stamp and signature of the responsible Registered Professional Engineer. Submittals without the proper signature will be returned without review.

B. Submit to local and state Authorities Having Jurisdiction and obtain AHJ's approval, three copies each:

1. Shop drawings.

2. Hydraulic calculations.
3. Copy of contract specification.
4. Equipment catalog sheets for all major equipment.

C. Submit to the Utah State Fire Marshal, three copies each:

1. Shop drawings.
2. Hydraulic calculations.
3. Copy of contract specification.
4. Equipment catalog sheets for all major equipment.
5. One copy of the Water Supply Analysis with date, time and temperature noted.

D. Submit to Architect for review and Architect's acceptance prior to fabrication and installation, five copies each:

1. Shop drawings.
2. Hydraulic calculations.
3. Equipment catalog sheets for all major equipment.
4. One copy of the water flow test with date, time and temperature noted.

E. Upon completion of installation submit to Architect two copies each:

1. NFPA 13, "Contractor's Material & Test Certificate for Aboveground Piping."
2. NFPA 13, "Contractor's Material & Test Certificate for Underground Piping."
3. As-built shop drawings with designer's signature and certification number.

1.9 WARRANTY

A. Materials, equipment, and workmanship shall be free from defects for 12 months from the "Date Left in Service with All Control Valves Open," shown on "Contractor's Material and Test Certificate." If any Work is found to be defective, Contractor shall promptly, without cost to Owner, and in accordance with Owner's instructions, either correct such defective Work, or if Owner has rejected it, remove if from the site and replace it with non-defective work. Submit two copies of Warranty Certificates to Architect.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Sprinkler equipment, heads and devices:

1. Central, Grinnell, Reliable, Star, Victaulic and Viking.

B. Backflow preventer:

1. Ames, Watts

2 .2 PIPE AND TUBE

A. Interior:

1. Ferrous piping, ASTM A795, ANSI/ASTM A53, ASTM A135, ANSI B36-10M, UL CRR (Corrosion Resistance Ratio) minimum 1.0, and copper tube, ASTM B251, Type L or M.

2 .3 FITTINGS

A. Interior.

1. Cast iron threaded, ANSI B16.4.
2. Cast iron flanged, ANSI B16.1.
3. Malleable iron threaded, ANSI B16.3.
4. Forged steel fittings, socket welded and threaded, ANSI B16.11.
5. Copper, ANSI B16.22, B16.18. Joints for connection of copper tube shall be brazed or soldered.
6. Other types of fittings may be used, but only those investigated and listed for fire sprinkler service.
7. Plain end couplings, saddle couplings, and clamp type couplings are not acceptable.

2 .4 HANGERS

A. Hangers shall conform to the minimum requirement of NFPA 13. A detail of each type of hanger shall be shown on the shop drawings and calculations for trapeze type hangers shall be provided with the hydraulic calculations.

2 .5 SEISMIC FITTINGS AND BRACES

A. Seismic bracing shall be installed per the requirements of NFPA 13. Calculations for the seismic bracing shall be provided including all piping within the Aarea of influence@ as described in NFPA 13.

B. Flexible connections shall be provided at the top and bottom of the system riser and at other locations as described in NFPA 13.

2 .6 SPRINKLER HEADS

A. Areas without ceilings: standard upright or pendent, quick response, factory bronze, ordinary temperature.

B. Areas subject to freezing: dry pendent or sidewall, chrome finish, intermediate temperature, with recessed chrome canopy.

C. Sprinklers of intermediate and high temperature ratings in specific locations as required by NFPA 13.

D. Spare heads in representative proportion to types installed and one head wrench for each type sprinkler.

1. Total quantity of spare heads shall be per the requirements of NFPA 13.
2. Spare heads to be contained in a wall mounted cabinet mounted adjacent to the riser.

2 .7 VALVES

A. Drain valves as required by the design and as indicated in NFPA 13.

B. OS&Y Gate Valve with supervisory switch.

C. Butterfly Valve with integral supervisory switch.

D. Four inch swing check valve for FDC.

E. One half-inch ball drip for FDC.

2 .8 ALARM DEVICES

A. Vane Type Water Flow Switch with retard (DPDT).

B. Valve supervisory switch (SPDT).

C. 10" Weatherproof Electric Bell.

PART 3 - EXECUTION

3 .1 INSPECTION

A. Inspect job site prior to fabricating materials. Coordinate and sequence installation with the progress of other mechanical and structural systems and components.

3 .2 INSTALLATION

A. Install systems in compliance with methods detailed in NFPA 13 and NFPA 24, including seismic requirements for Area 1, maximum potential for earthquake damage.

B. Sprinkler heads shall be centered in 2' x 2' ceiling tiles and shall be centered in the 2' dimension and at the quarter, half, or three-quarter point in 2' x 4' ceiling tiles.

C. Where pipes pass through fire rated walls, partitions, ceilings and floors, maintain the fire-rated integrity with listed sealers and materials.

D. Provide chrome-plated escutcheons where exposed pipe passes through walls, ceilings, or other building components.

3 .3 FIELD QUALITY CONTROL

A. Obtain permits and post bonds as required by state and local AHJ's (Authorities Having Jurisdiction).

B. Inform AHJ's of job progress. Request presence of AHJ's, perform tests and document results using Contractor's Material and Test Certificates.

1. Existing piping may be Ablanked-off@ when testing new piping. This contract does not require the testing of work installed by others.

3 .4 DISINFECTION

A. Introduce dosage of 50-ppm chlorine in underground and overhead piping. During the contact period open and close all system valves several times. At end of 24-hour retention period at least 10 ppm shall remain throughout the piping.

B. At end of retention period, flush system until residual chlorine is reduced to less than 1.0 ppm.

3 .5 CLEANING

A. Remove oil, scale, debris, and foreign substances from interior and exterior of devices, equipment, and materials prior to installation.

B. Upon job completion, remove tools, surplus materials and equipment. Leave all areas broom clean.

3 .6 ACCEPTANCE

A. Acceptance of installation is subject to final inspection and approval by:
1. Architect or his designated representative.
2. Local Building Department and Fire Marshal.
3. Utah State Fire Marshal’s Office.

END OF SECTION 21 13 13