SECTION 031000 CONCRETE FORMWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.
B. Openings for other work.
C. Form accessories.
D. Form stripping.

1.02 RELATED SECTIONS

A. Section 032000 - Concrete Reinforcement.
B. Section 033000 - Cast-in-Place Concrete.
C. Section 072600 - Under - Slab Vapor Barrier

1.03 REFERENCES

A. American Concrete Institute (ACI):
   1 . ACI 117-90 Specifications for Tolerances for Concrete Construction and Materials.
   2. ACI 301-96 Specification for Structural Concrete for Buildings.
   3. ACI 318-95 Building Code Requirements for Reinforced Concrete.
   4. ACI 347 -(R94) Recommended Practice For Concrete Formwork.
B. American Plywood Association (APA):
   1. APA Plywood Design Specification, Form No. Y51 OL, August, 1986.
   2. APA Design/Construction Guide, Concrete Forming, Form No. V345S, Sept, 1996.
C. National Forest Products Association (NFPA).
   1. National Design Specification for Wood Construction, 1986 Editions with 1990 Revisions.
   2, Design Values for Wood Construction, January 1986, with 1990 Revisions.

1 .04 CONTRACTOR RESPONSIBILITY

A. Formwork design and engineering.
B. Construction of formwork, shoring, removal of forms, and re-shoring.
C. Providing a safe structure at all times and insuring safety to human life and property.

1.05 DESIGN REQUIREMENTS:

A. General: In accordance with the references.
B. Design: Design formwork to withstand applicable hydrostatic pressure of concrete plus dead weight, construction loads and vibrations.
B. Limit deflection of studs and whalers to 1/400 of the span for architectural concrete and 1/360 of the span for other concrete. limit deflection of form facing material exposed to view to 1/240 of the span.
C. Build adequate supports into forms for:
   1. load concentrations
   2. external vibrations

1.06 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Shop Drawings:

1. location of columns and beams by dimension.
2. Use the structural member designation system used on the Drawings.
3. Joint locations and details.
4. Size and locations of sleeves, blockouts, and slab penetrations. Shoring and support layout.
5. Reshoring layout.
6. Indicate:
   a. Form materials, types, and thickness.
   b. Form tying system and layout.
   c. Form accessories.
   d. Details to be used at sleeves, blockouts, and slab penetrations.
   e. Type and capacity of shores, supports, and reshores.
7. Reshoring procedure.
8. All shop drawings to be signed, dated and sealed by the formwork designer.
9. Product Data: Manufacturer's product specifications and installation instructions for manufactured products, including form sealer and release agent.
10. Concrete Strength Tests: Testing laboratory's reports for testing required in this Section.

1.07 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301.

B. Maintain one. copy of ACI 301 on site.

1.08 QUALIFICATIONS

A. Form Work Designer: Design formwork under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Texas.

1.09 REGULATORY REQUIREMENTS

A. Conform to ACI301 for design, fabrication, erection and removal of formwork.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle formwork materials and accessories at the site to prevent any damage.

Store formwork materials and accessories off ground in ventilated and protected manner to prevent deterioration from moisture.

1.11 COORDINATION

A. Coordinate this Section with other Sections of work, which require attachment of components to formwork.

B. If formwork is placed after reinforcement results in concrete cover over reinforcement that is insufficient, request instructions from Architect/Engineer before proceeding.

PART 2 - PRODUCTS

2.01 WOOD FORM MATERIALS

A. Plywood: APA B-B Plyform Class I, Exterior Grade, mill oiled and edge sealed.
B. Lumber: Southern Pine species; Select Structural No. 2 grade or better with grade stamp clearly visible, and conforming to NFPA design values for visually graded lumber ..

2.02 PREFABRICATED FORMS

A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting and stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

2.03 FORMWORK ACCESSORIES

A. Form Release Agent:
   1. EUCO-SUP, Euclid Chemical Company.
   2. DUOGARD, W.R. Meadows, Inc.
   3. DEBOND, l&M Chemical Company
B. Corners: Chamfered using wooden strip.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine substrate and conditions under which concrete formwork is to be performed. Have the installer notify the Contractor in writing, with a copy to the Architect, if substrate is unsatisfactory. Do not begin the work until unsatisfactory conditions have been corrected in a manner acceptable to installer. Beginning of work indicates acceptance of the substrate as satisfactory by the installer.

3.02 INSTALLATION

A. General: In accordance with ACI 301, Design, erect, support, brace and maintain formwork to support vertical and lateral loads which might be applied until such loads can be supported by the concrete structure.
   1. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
   2. Form Construction:
      a. Fabrication: Fabricate forms for easy removal without hammering or prying against concrete surfaces.
      b. Provide crush plates or wrecking plates where stripping may damage cost concrete surfaces.
      c. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.

d. Form exposed corners of beams and columns with beveled chamfer strips.
e. Kerf wood inserts for forming keyways, reglets, and recesses to ease removal.
f. Provide camber in formwork as indicated on the Drawings.

3. Support: Provide bracing to ensure stability of formwork.
a. Erect and maintain bracing to support vertical, lateral, and asymmetrical loads until such loading can be supported by inplace concrete structures.
b. Provide shores and struts with means of adjustment capable of taking up formwork settlement occurring during placement of concrete, using wedges, jacks, or a combination there of.

4. Provisions for Other Trades:
a. Provide openings in concrete formwork to accommodate work of other trades.
b. Accurately place and securely support items to be built into forms.

5. Temporary Openings:
a. Provide temporary openings in formwork where interior area IS inaccessible for:
Clean out.
b. Inspection before concrete placement.
c. Concrete placement.
d. Provide temporary openings at the base of column and wall forms.
e. Position temporary openings in an inconspicuous location.
f. Brace closures of temporary openings and set tightly to forms to prevent loss of concrete mortar.
g. Preparation and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete.
i. Form Surface Treatment:
a. Before placing reinforcing steel or concrete, coat the form surfaces with a material that will effectively prevent absorption of moisture, prevent bond with concrete, and not stain concrete.
b. A field applied form release agent or factory applied nonabsorptive liner may be used.
c. Do not allow form release agent to stand in puddles, come into contact with reinforcing steel or hardened concrete against which fresh concrete is to be placed.
d. Remove loose metal, wood chips, sawdust, dirt, trash, and other debris just prior to concrete placement.
ii. Re-tighten forms during and immediately after concrete placement to eliminate mortar leaks.

B. Installation Tolerances:
1 . Construct formwork in accordance with tolerances specified in ACI 117.

2. Regardless of specified tolerances construct building so that no part extends beyond the legal boundaries of the project.

C. Installation of Embedded Items:
1. General: Set and build into the work anchorage devices, inserts, and other embedded items required for material attached to or supported by cast-in-place concrete.
2. Use setting drawings, diagrams, instructions, and directions provided by suppliers of the items to be attached.
3. Do not place embedded items in any manner that will displace or interfere with the reinforcing steel
4. Conduit: Embed all electrical conduit in slabs.
5. Wire conduit inside layers of reinforcement.
6. Wire conduit to reinforcement perpendicular to the conduit. Do not wire to parallel reinforcement.
7. Separate parallel conduit by 2 inches, minimum.
8. Waterstops: Install in greatest .continuous lengths possible. Do not displace concrete reinforcement.
   a. Splice waterstops in accordance with manufacturer's recommendations.

9. Junction Boxes:
   a. Boxes of any depth may be located in slabs, beam soffits, and headers.
   b. Do not locate in joist soffits.
   c. Provide header to accommodate junction boxes over 2 1/4 inches deep.

D. Removal of Forms:
1. Formwork supporting weight of concrete: Including but not limited to beam, girder, and slab forms.
   a. Remove forms after concrete has attained 70% of its design compressive strength.
   b. Concrete strength is determined using field cured concrete cylinders.
   c. Formwork not supporting weight of concrete: Including but not limited to sides of beams, walls, and columns.
2. Remove forms after concrete has been in place and curing at not less than 50 degrees (F) for 24 hours and providing concrete is sufficiently hard so as not to be damaged by form removal.
3. Form Ties: Break back snap ties and remove pull ties.

3.03 FIELD QUALITY CONTROL

A. Removal based on strength of concrete specimens: The concrete shall be presumed to have reached its 28 day strength or specified percentage thereof when concrete tests mode using either of the following indicates the strength has been achieved.
1. Testing based on field cured test cylinders.

B. Except for field curing and age at test, mold and test specimens as specified in Section Cast-tn-Place Concrete.

1. Field cure specimens under the most unfavorable conditions prevailing for any portion of the concrete represented.
2. Testing based on laboratory cured test cylinders.
3. Except for age at test, mould, cure, and test specimens as specified in Section Cast-tn-Place Concrete.
4. Test specimens at an age that is equal to the length of time that the in-place formed concrete has been cured as specified in Section 03300, Cast-tn-Place Concrete.
5. Determine the length of time the in-place formed concrete has cured by the cumulative number of days or fractions thereof, not necessarily consecutive, during which:
   (1) The temperature of the air in contact with the concrete is Above 50 degrees (F).
   (2) The concrete has been damp or sealed from evaporation and moisture loss by a membrane forming curing compound or in prace formwork.
6. The result of a test is based on the average compressive strength of two specimens.

Obtaining, curing, and testing of concrete cylinders, other than those required for field quality control in Section Cast-In-Place Concrete, is at the Contractor's option and expense.

END OF SECTION

SECTION 03200 CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES
- A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.02 RELATED SECTIONS
- A. Section 031 00 - Concrete Formwork.
- B. Section 03300 - Cast-in-Place Concrete.
- C. Section 07260 - Under - Slab Vapor Barrier

1.03 REFERENCES
- A. American Concrete Institute (ACI):
  1. ACI 301-99 Specification for Structural Concrete for Buildings.
  2. ACI SP66 (94) Detailing Manual
- B. American Society for Testing and Materials (ASTM):
  1. ASTM A 108-81 (R88) - Steel Bars, Carbon, Cold Finished, Structural Quality.
  2. ANSl ASTM A185-94 Welded Steel Wire Fabric for Concrete Reinforcement.
  3. ASTM A496-94 Steel Wire, Deformed, for Concrete Reinforcement.
  4. ASTM A615-94 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
  5. ASTM A706-92b low-Alloy Steel Deformed Bars for Concrete Re-inforcement.
  6. ASTM A 1116-89 - Fiber Reinforced Concrete and Shotcrete.
  7. ASTM D1751-83 Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.
- C. American Welding Society (AWS):
  1. ANSI/AWS D1.1-96 - Structural Welding Code-Steel.
  2. ANSl/AWS D1.4-92 - Structural Welding Code-Reinforcing Steel.
  3. Concrete Reinforcing Steel Institute (CRSI):
  4. CRSI MSP- 1-97 - Manual· of Standard Practice, 26th Edition, January, 1997.
  5. CRSI Reinforcement Anchorage and Splices, 4th Edition, 1997.

1.04 SUBMITTALS
- A Submit under provisions of Section 01300.
- B. Shop Drawings:
  1. Indicate bar sizes, spacing, locations, and quantities of reinforcing steel and wire fabric.
  2. Bending and cutting schedules.
  3. Supporting and spacing devices.
  4. Use the same designation numbers for slabs, joists, beams, girders, columns, and footings as used on the Drawings.
  5. Detail beams and walls in elevation.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Submit manufacturer's data and installation instructions for:
   1. Mechanical splice device.
   2. Headed concrete anchor.
   3. Deformed bar anchor.
E. Welder's qualification certificates.

1.05 QUALITY ASSURANCE

A Perform Work in accordance with CRSI Manual of Practice ACI 301 and ACI SP 66.
B. Submit certified copies of mill test report of reinforcement materials analysis.
C. Employ welders on the Work that have successfully qualified for the welding positions required in accordance with Chapter 6, Qualification, AWS D1.4 within the last 12 months. Welders are required to carry proof of their qualification on their person.

1.06 COORDINATION

A. Coordinate with placement of formwork, formed openings and other Work.

PART 2 - PRODUCTS

2:01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615, 60-ksi yield grade; deformed billet steel bars.
B. Weldable Reinforcing Steel: ASTM A706, 60 ksi yield grade; deformed low-alloy steel bars.
C. Welded Steel Wire Fabric: ASTM A185 Plain Type; flat sheets.
D. Fiber Reinforcement: ASTM C-1116 type III.
   1 . Use only 100 per cent virgin polypropylene, fibrillated fibers specifically manufactured for use as concrete secondary reinforcement.
   2. Do not use fibers containing reprocessed olefin materials.
   3. Minimum volume per cubic yard of concrete: 0.1 percent (1.5 pounds).
   4. Fiber length: 1/2 or 3/4 inch.
E. Headed Concrete Anchors:
   1. Flux filled.
   2. Made from cold drawn steel in accordance with ASTM A 108, grades C-1010 through C-l 020, yield strength, 50 ksi.
F. Deformed Bar Anchors:
   1. Flux filled.
   2. Made from cold drawn steel in accordance with ASTM A-108, yield strength, 70-ksi.
   3. Deformed in accordance with ASTM A-496.

2.02 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type.
B. Bar Support: Includes spacers, chairs, bolsters, ties and other devices for spacing, supporting and fastening reinforcement in place.
   1. General: In accordance with CRSI Manual of Standard Practice.
   2. Factory made.
   3. Use bar support heights that produce the concrete cover called for on the Drawings.

4. Use bar supports capable of supporting construction loads without permanent deflection.
5. Spacing: At 4 feet maximum with first support 2 feet from end of bar supported.

C. Exposed Concrete: Provide supports in contact with formwork that are:
1. High density all plastic (CRSI Class 1).
2. Stainless steel protected (CRSI Class 2).

D. Typical support types and minimum configurations.
1. Joist chairs: 3 leg, 3-position type, 6-ga. wire.
a. Beam and slab bolsters: continuous, type 7 -go. Wire or cementitious fiber reinforced.
2. Individual high chairs:
a. legs 5 inch and under: 2-ga. wire, or high density all plastic.
b. legs 5 to 12 inches: 0-ga. wire.
3. Do not use individual high choirs with legs over 12 inches.
4. Vertical reinforcement: wheel type, high density all plastic.
5. Supports bearing on earth.
a . Precast concrete blocks.
b. Support specifically designed for this purpose, e.g. with sand plates.

E. Mechanical Splices: Install in strict accordance to manufacturer's recommendations.
1 . Coupler Splice Devices: Use one of the following complying with requirements of ACI 318, Section 12.14.3.4. Submit for approval.
a. Erico Products, Inc., Cadweld
b. Erico Products, Inc., Lenton taper threaded connector.
2. End Bearing Splice Device: Use one of the following complying with requirements of ACI 318, Section 12.16.4. Submit for approval.
a. Erico Products Inc., Speed Sleeve
2. Gateway Erectors Inc., G-loc.
3. Stricon Products ltd., Pre-Set
4. Substitutions: Under provisions of Section 01630.
5. Slab-On-Grade Expansion Joint Filler: conforming to ASTM D1751.
6. Non-extruded bituminous type
7. Slab-On-Grade Construction Joint: Minimum 24 go. galvanized steel with formed tongue and groove keyed joint, full depth of slab. Furnish complete with stake pins.

F. Expansion Bolts:
1. Install in strict accordance with manufacturer's recommendations.
2. Acceptable manufacturer's:
a. Hilti Fastening Systems Inc., Hilti Kwik Bolt II, Carbon Steel.
b. IIW Ramset/Red Head, Trubolt, Carbon Steel.
c. Simpson Strong-Tie Company, Inc., Wedge-All.

G. Adhesive Anchor:
1 . Install in strict accordance with manufacturer's recommendations.
2. Acceptable manufacturer's:
a. Hilti Fastening Systems Inc., HIT HY 150 Injection Adhesive Anchor.

b. IIW Ramset/Red Head, EPCON Ceramic 6 Epoxy Anchoring System.
c. Simpson Strong-Tie Company, Inc., Epoxy-Tie Adhesive System.
d. Substitutions: Under provisions of Section 01630.

2.03 FABRICATION

A Fabricate concrete reinforcing in accordance with CRSI Manual of Standard Practice.
B. locate reinforcing splices where indicated on Drawings.

PART 3 - EXECUTION

3.01 PLACEMENT

A Place, support and secure reinforcement against displacement. Do not deviate from required position.
B. Do not displace or damage vapor barrier.
C. Accommodate placement of formed openings.
D. Conform to ACI 318 for concrete cover over reinforcement.

3.02 WELDING

A. Reinforcing Bars:
1. General: Welding of reinforcing bars is only permitted at locations expressly detailed or permitted in writing by the Structural Engineer.
2. Execute all welding in accordance with AWS 01.4.
3. Provide reinforcing bars conforming to ASTM A 706 for welding unless permitted in writing by the Structural Engineer.
4. Welding of crossing bars (tack welding) is prohibited.
B. Headed concrete anchors and deformed bar anchors:
1. Install in strict accordance to manufacturer's recommendations, and in accordance with Chapter 7, Stud Welding, AWS 01.1.

3.03 FIELD QUALITY CONTROL

A. Notify the Architect 24 hours, minimum, prior to concrete placement to allow time for review of installation of all concrete reinforcement.
B. The Engineer or his representative will review installation of concrete reinforcement.
C. Correction of reinforcement not installed in accordance with the Contract Documents is the Contractor's responsibility.
D. Inspect installation of headed concrete anchors and deformed bar anchors in accordance with Chapter 7, Stud Welding, AWS 01.1.

END OF SECTION

SECTION 03300 CAST -IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Cast-in-place Concrete
   1. Floors.
B. Slabs on grade.
C. Control and expansion joint devices associated with concrete work.
D. Equipment pads.

1.02 RELATED SECTIONS

A. Section 031 00 - Concrete Formwork
B. Section 03200 - Concrete Reinforcement.
C. Section 07260 - Under - Slab Vapor Barrier

1.03 REFERENCES

A. American Concrete Institute (ACI):
   1. ACI 117-90 Specifications for Tolerances for Concrete Construction and Materials.
   2. ACI 301-96 Specification for Structural Concrete for Buildings.
   3. ACI 302.1 R-96 Guide for Concrete Floor and Slab Construction.
   4. ACI 304R-00 Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
   5. ACI 304.2 R-96 Revised 1985 Placing Concrete by Pumping Methods.
   6. ACI 304.5 R-91 Botching, Mixing, and Job Control of Lightweight Concrete
   7. AC1305R-91 Revised 1982 Hot Weather Concreting.
   8. ACI 306R-88 Revised 1983 Cold Weather Concreting.
   9. ACI 308-92 Standard Practice for Curing Concrete.
   10. ACI 318-95 Building Code Requirements for Reinforced Concrete.
   11. SP- 15 (95), field reference manual, specifications for structural concrete buildings, ACI301-89 with selected ACI and ASTM references.
B. American Society for Testing and Materials (ASTM):
   1. ANSI ASTM D1751-04 Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
   2. ASTM C31-95 Method of Making and Curing Concrete Test Specimens in the Field.
   3. ASTM C33-93 Concrete Aggregates.
   4. ASTM C94-94b Ready-Mixed Concrete.
   5. ASTM C143-90a Test Method for Slump of Portland Cement Concrete.
   6. ASTM C150-95a Portland Cement.
   7. ASTM C171-92 (1986) Specification for Sheet Materials for Curing Concrete.
   8. ASTM C173-94 Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
   9. ASTM C230-03 Flow Table for Use in Tests of Hydraulic Cements.
   10. ASTM C231-91b Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
   11. ASTM C260-94 Air Entraining Admixtures for Concrete.
   12. ASTM C494-92 Chemical Admixtures for Concrete.
   13. ASTM C618-94a Fly Ash and Raw or Cakinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
   14. ASTM C469-02 Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.

15. ASTM E 1155-96 Standard test method for determining floor flatness and levelness using the F-number system.

C. Department of the Army, U.S. Army Corps of Engineers (USACE)
1. CRD - C611 -89 Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
2. CRD - C621-88 Specification for Non Shrink Grout.

1.04 SUBMITTALS
A. Submit under provisions of Section 01300.
B. Product Data
1 . Mix design for each class of concrete.
a. Fully document proposed materials and mix designs.
b. Submit mix design for review by testing laboratory.
c. Submit mix design and documentation 56 days, minimum, prior to use in field.
2. Manufacturer's recommendations for use of admixtures and cunng compound.
C. Quality Control Submittals: Submit two copies plus the number the contractor wants returned.
1 . Mill test of portland cement.
2. Aggregate tests.
3. Field cast cylinders. See Field Quality Control.
4. Floor finish tolerance:
5. Report of flatness and levelness test results for each test area.
6. Layout of test sections and sample measurement lines with each test area. Provide layout before start of testing operations.

1.05 PROJECT RECORD DOCUMENTS
A. Accurately record actual locations of embedded utilities and components which are concealed from view.

1.06 QUALITY ASSURANCE
A. Field References: Maintain one copy of each reference listed below in Contractors field office at all times.
B. SP-15, Field Reference Manual.
C. Perform Work in accordance with ACI 301.
D. Acquire cement and aggregate from same source for all work.
E. Conform to ACI 305R when concreting during hot weather.
F. Conform to ACI 306R when concreting during cold weather.

1.07 COORDINATION
A. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS
A. Cement: ASTM C150, Type I or III, natural color.
B. Aggregate:
1. Normal Weight
2. Fine Aggregate: Quartz sand free of sulfates ASTM C33.
3. Coarse Aggregate: ASTM C33.
4. Water: clean, potable, and free from deleterious amounts of acids, alkalies, or organic materials.

2.02 ADMIXTURES

A. General: Do not use calcium chloride or admixtures containing more than 0.1 % chloride ions.
B. Air Entraining: ASTM C260.
C. Water-Reducing ASTM C494, Type A.
D. Water-Reducing and Retarding: ASTM C494, Type D.
E. High Range Water-Reducing (Superplasticizer): ASTM C494, Type For G.
1. The Euclid Chemical Company:
a. Type F: Eucon-37.
b. Type G: Eucon-537.
2. Grace Construction Products:
a. Type F: Daracem-l00.
b. Type G: Daracem-l00.
3. Master Builders Technologies:
a. Type F: Rheobuild 1000.
b. Type G: Rheobuild 716.
4. Substitutions: Under provisions of Section 01630.
F. Fly Ash: ASTM C618, Type C or F.
1. Use when permitted by Architect.
2. Limit use to not exceed 25% of cement content by weight.

2.03 ACCESSORIES
A. Bonding Agent: Polymer resin emulsion, polyvinyl acetate, latex emulsion.
B. Vapor Barrier: Polyethylene sheeting, 6 mils thick.
C. Curing Materials:
1. Moisture retaining sheet: One of the following, complying with ASTM C 171-
2. Waterproof paper
3. Polyethylene film
4. Polyethylene-coated burlap
5. liquid membrane forming curing compound:
a. Use on a surface to be cured where:
i . A topping material will not be required to bond.
ii. A penetrating sealer will not be applied.
iii. Use one of the following:
a. L & M Chemicals, Inc. Dress & Seal 30.
b. Master Builders, Master Kure
c. Euclid Chemical Co., Super Rez-Seal.
d. Sonneborn Building Products, Kure-n-Seal 30.
iv. To be used where a topping material or penetrating sealer will be required to bond to the surface to which this material is applied. Use the following:
a. Euclid Chemical Company, Kurez DR.
D. Penetrating Sealer: Use one of the following:
1 . Master Builders, Masterseal SL
2. L & M Chemicals, Inc. Pentane
3. Harry S. Peterson Co., Inc., ISO Flex 618.

2.04 NON-SHRINK GROUT
A. Install in strict accordance to manufacturer's recommendations found in each manufacturer's data publication.
B. Acceptable Manufacturers:
1. Master Builders, Masterflow 928 Grout
a. Application: Fluid. installation consistency.
2. Master Builders, Construction Grout
b. Application: Stiff or plastic installation consistency.

3. The Euclid Chemical Company, Hi-Flow Grout
   a. Application: Fluid installation.
4. The Euclid Chemical Company, EUCO N-S Grout
   a. Application: Stiff or plastic installation consistency.
5. Burke, Non-ferrous, Non-shrink Grout
   a. Application: Fluid installation consistency.
6. Burke, Damp Pack Grout
   a. Application: Stiff of plastic installation consistency.
7. Substitutions: Under provisions of Section 01630.

C. Installation Consistency Criteria:
1. Fluid:
   a. Requires forming for installation.
   b. to 30 seconds flow by CRD-C611. Flow Cone Method.
2 . Plastic or Stiff:
   a. Does not require forming.
   b. Plastic: 100% flow by ASTM C 230-83.
   c. Stiff: 40% flow by ASTM C 230-83.

2.05 JOINT DEVICES AND FILLER MATERIALS

A. Joint Filler ASTM D1751; Asphalt impregnated fiberboard or felt, 1/2 inch thick; tongue and groove profile.

B. Construction Joint Devices for Slabs-On-Grade: Integral galvanized steel 24 gauge formed to tongue and groove profile, ribbed steel spikes with tongue to fit top screed edge.

C. Sealant and Primer: As specified in Section 07920.

2.06 CONCRETE MIX

A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.

B. Concrete Mix Designs: C. Established concrete mix proportions on the basis of field experience or laboratory trial batches as specified in ACI 301 in Section 3.9, "Proportioning on the basis of previous field experience or trial mixtures," with the following exceptions:
1. The standard deviation is determined from tests of mixes that:
   a. Contain the same materials as mix designs for the proposed work.
   b. Represent concrete produced to meet the same design strength as that specified for the proposed work.
2. When acceptable field-test records or trial mixture data is not available, and, if approved by the Architect, the concrete mix proportions may be established as specified in ACI 301, Section 3.10, "Proportioning based on empirical data."
3. Retain an independent testing laboratory to conduct tests made on trial mixes used in proportioning concrete mixes for the proposed work.
4. Produce trial mixes within 12 months of submission of mix design for approval.

C. The following classes of concrete are required:

CLASS	MINIMUM COMPRESS IV E STRENGTH	ACCEPTANCE CRITERIA INTERVAL	SLUMP RANGEl	MINIMUM MODULUS OF ELASTICITY	ACCEPTANCE CRITERIA INTERVAL
	f 'c	f'c		E	E
	PSI	DAYS	IN	Xl 06 PSI	DAYS
A	5000	28	4 ± 1	N/A	N/A
B	4000	28	4 ± 1	N/A	N/A

D. Air Content: Provide concrete containing entrained air and conforming to ACI 301 when concrete will be subject to potentially destructive exposure (other than wear of loading) such as freezing and thawing, severe weathering, or deicing chemicals.
E. Provide concrete containing a maximum air content of 3% when used in interior slabs subject to abrasion.
F. Use accelerating admixtures in cold weather only when approved by Architect/Engineer. Use of admixtures will not relax cold weather placement requirements.
G. Use set retarding admixtures during hot weather only when approved by Architect/Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION
A. Examine substrate and conditions under which concrete work is to be performed.
B. Have installer notify the Contractor in writing, with a copy to the Architect, if substrate is unsatisfactory.
C. Do not begin work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
D. Beginning of work indicates the substrate is acceptable and satisfactory to the installer.
E. Verify that reinforcement is in place, fastened, supported, protected against displacement, and that no reinforcement is touching formwork.
F. Verify that conduits, pipes, sleeves, inserts, hangers, steel equipment, grounds, anchors and work that is to be built into the concrete are accurately placed, positioned securely, and will not cause hardship in placing the concrete.

3.02 PREPARATION
A. General: In accordance with ACI 301.
B. Surface Preparation:
1. Remove debris and foreign matter from forms. Drain water from footing trenches and remove mud film and loose dirt.
2. Soak wood forms with water and coat metal and fiberglass forms with oil.
3. Notify Architect at least 24 hrs. before placing is begun.
4. Install vapor barrier under interior slabs on grade. Lap joints minimum 6 inches and seal watertight by taping edges and ends.
5. Install joint fillers, primer, and sealant in accordance with manufacturers instructions.

3.03 PLACING CONCRETE
A. General: Place concrete in accordance with ACI 301 and as specified in this section.
B. Mix and discharge concrete in such quantities as required for immediate use and place fresh before loss of slump occurs.
C. Completely discharge concrete within 1 1/2 hours or before drum has revolved 300 revolutions, whichever comes first, after introduction of the mixing water to the cement and aggregates or introduction of cement to the aggregates.
B. Transportation:
C. Transport concrete to point of final deposit by cart, buggy, conveyor, or pump. If concrete is to be transported more than 50 ft. in carts or buggies, equip them with pneumatic tires.
1. Move carts and buggies only on temporary runways built over the floor system. Do not allow runway supports to bear on reinforcement or fresh concrete.
D. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches and seal watertight.
E. Install construction joint device in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

1. Install joint covers in longest practical length, when adjacent construction activity is complete.

F. Place concrete continuously between predetermined expansion, control, and construction joints.

G. Do not interrupt successive placement; do not permit cold joints to occur.

H. Saw cut joints in slab-on-grade as soon as the concretehas hardened sufficiently to prevent the aggreates from being dislodged by the sow. Complete the joint cutting activity before shrinkage stresses become sufficient to produce cracking.

1 . Using 3/16 inch thick blade, cut into 1/4 depth of slab thickness, unless noted otherwise on the drawings.

3.04 SEPARATE FLOOR TOPPINGS

A Prior to placing floor topping, remove deleterious material. Broom and vacuum clean.

B. Place required dividers, edge strips, reinforcing, and other items to be cast in.

1. Apply bonding agent to substrate in accordance with manufacturers instructions.

D. Place concrete floor toppings to required lines and levels.

3.05 FLOOR FINISH TOLERANCE

A. Interior Slabs

B. General: In accordance with ACI 302.1 R-89 and ASTM E 1155.

C. Testing laboratory to perform all tests and prepare reports for floor finish tolerance.

D. When ambient or slab temperatures are less than 40° (F.) or more than 100° (F.) obtain individual slab elevations manually. Electronic recording of readings outside of this temperature range is not acceptable unless a submittal from the manufacturer of the recording device stating a different accurate operating range is submitted to the engineer for review before using the equipment

E. Test layout: In accordance with ASTM E 1155.

1. Test area: Area of concrete placed in a continuous pour.

1. Test sections: Area bounded by grid lines, slab edges, or construction joints.

F. Sample measurement lines: As defined in ASTM E 1155.

G. Flatness and levelness tolerance:

1. Specified overall value (SOV):

2. Floor flatness = FF (SOV) = 22.

3. Floor levelness = Fl (SOV) = 18.

4. Minimum local value (MLV):

5. Floor flatness = FF (MLV) = 15.

6. Floor levelness = Fl (MLV) = 10.

H. Timeliness of tests:

1. Obtain floor tolerance measurements within 24 hours after slab installation.

2. Obtain measurements prior to removal of shores and forms supporting floor being measured.

3. Test reports for floor finish tolerance:

4. Provide report of test results to contractor and architect within 72 hours after slab installation.

5. Include in the report a running tabulation of all overall FF and overall Fl values of slabs installed to date.

6. Acceptance criteria: Remedial work may be required if either of the following is not met.

7. The composite value of the entire test area must be equal or greater than either the entire specified overall F-numbers.

I. The values for any test section must be equal or greater than either of the minimum local F-numbers. Exterior slabs

1 . Finish exterior slabs to drain freely.

2. Cut out and replace depressions that hold water.

3.06 CONCRETE FINISHING

A. Formed Surfaces
   1 . Formed concrete surfaces to be left exposed to view or to receive an applied finish, provide smooth rubbed finish.
   2. Formed surfaces not exposed to view or to receive an applied finish, provide rough form finish.

B. Finish concrete floor surfaces in accordance with ACI 301.
   1. Wood Float Finish: Surfaces to receive modified asphalt roof membrane system and surfaces to receive finishes applied with thickset tile or thickset stone.
   2. Smooth Troweled Finish: Surfaces to receive membrane waterproofing, EPDM fully adhered roof membrane, and all other surfaces whether scheduled to receive additional finish materials or not.
   3. Stamped Finish: Exterior patios and entrances noted on finish schedule and or drawings. Stamping pattern to be a wood grain look as selected by the Architect from the full range of stamping finishes.

3.07 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Cure floor surfaces in accordance with ACI 308.
   1. Surfaces to receive roof membranes and membrane waterproofing: Moisture cure only; do not use curing compounds or penetrating sealer.
   2. Ponding: Maintain 100 percent coverage of water over floor slab areas continuously for 4 days.

F. Spraying: Spray water over floor slab areas and maintain wet for 7 days.

G. Membrane forming curing compound:
   1 . Flatwork: Coat with curing compound immediately after final troweling when surface water sheen has disappeared.
   2. Formed vertical surfaces: Apply immediately after form removal.

H. Apply sealing and curing compound to the following areas at substantial completion.
   1 . Mechanical rooms
   2. Electrical rooms
   3. Storerooms
   5. Any other concrete slab that will not to receive a finish material or surface treatment and will remain exposed.

I. Duration of curing procedures: Conform to paragraph 12.2.3 AC1301.

3.08 FIELD QUALITY CONTROL

A. Field testing will be performed in accordance with ACI 301

B. Provide free access to Work and cooperate with appointed firm.

C. Sampling of Concrete
   1. General: In accordance with ASTM C31 .
   2. Frequency: Obtain one set of test specimens for each 100 cu. yds., or fraction thereof, of each mix design placed in one day.
   3. Number of specimens in a set.
      a. Twenty-eight day acceptance criteria four 6x12 cylinders.

D. Site testing performed when each set of test specimens are made.
   1. Slump: In accordance with ASTM C143.
   2. Air Content: In accordance with ASTM C231, pressure method for normal weight concrete.

3. Temperature: Determine the ambient temperature and the temperature of the sample.

E. laboratory Testing
   1. Unit weight.
   2. Compressive strength verification: In accordance with ASTM C31.
   3. Frequency of testing for compressive strength verification:
   4. Twenty-eight day acceptance criteria:
   5. One cylinder tested at seven days for information.
   6. Two cylinders tested at twenty-eight days for acceptance.
   7. One cylinder held in reserve.

F. Modulus of elasticity testing program
   1 . For concrete classes A and B.
   2. Test one specimen from the first ten sets of specimens for each concrete class.
   3. Specimen curing:
      a. Moist cure specimen for first ten accordance with ASTM C31.
      b. Air cure specimen for time remaining until test.
   4. Test specimen at ninety-one days.
   5. Test for modulus of elasticity in accordance with ASTM C469.
   6. Obtain concrete ultimate strength using same cylinder.

3.09 REPAIR OF SURFACE DEFECTS

A. General: Surface defects occur between the surface of the concrete and the first layer of reinforcement below.
B. Inspect concrete surfaces immediately upon removal of forms.
C. Excessive honeycombing or embedded debris in concrete is not acceptable.
   1. Notify Architect/Engineer upon discovery.
D. After specific instructions by Architect/Engineer, patch imperfections In accordance with Chapter 9, Repair of Surface Defects, ACI 301.

3.10 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances, specified requirements, or cold joints.
B. The Architect/Engineer will determine repair or replacement of defective concrete.
C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

END OF SECTION

SECTION 033600 CONCRETE FINISHES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete Floor Stain.

B. Concrete Floor Sealer.

C. Concrete Floor Wax.

D. Concrete Floor Polish.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete.

1.3 REFERENCES

A. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.

B. ASTM C 979 - Standard Specification for Pigments for Integrally Colored Concrete.

C. ASTM D 3359 - Standard Test Methods for Measuring Adhesion by Tape Test.

D. ASTM D 3363 - Standard Test Method for Film Hardness by Pencil Test.

E. South Coast Air Quality Management District (SCAQMD) Rule 1113 (2008).

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance Instructions.

C. Selection Samples: For each finish product specified, a sample of the manufacturer's full range of available colors and patterns.

D. Installer's Project References: List projects of similar type and scope completed successfully within the last three (3) years. Include project name and location, name of Architect, and type and quantity of material applied.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years experience.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with demonstrated experience in installing products of the same

type and scope as specified.

C. Pre-installation Meeting: Convene a pre-installation meeting before start of Work. Require attendance of parties directly affecting work of this section, including Contractor, Architect, and Applicator. Review surface preparation, application, protection, and coordination with adjacent surfaces.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Mock-up areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable completed project.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation. Store materials in a clean, dry area indoors in accordance with manufacturer's instructions. Keep containers sealed until ready for use.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits. Do not apply materials in wet weather.

1.8 WARRANTY

A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Kemiko Concrete Stains, which is located at: 6663 SW Beaverton-Hillsdale Hwy Suite 242 Portland OR 97225; Tel: 503-296-7756; Fax: 503-291-1753 E-Mail: jo@kemikostain.com Web: www.kemikostain.com

B. Contact Information: Kemiko, 6663 SW Beaverton-Hillsdale Hwy Suite 242, Portland, OR 97225 Tel: (503) 296-7756; Fax: (503) 291-1753; E-Mail: jo@kemikostain.com Web: www.kemikostain.com.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 CONCRETE STAIN

A. Kemiko Stone Tone Stain: Combination of acid solution, wetting agents, and metallic ions. When mixed with water and applied to Portland cement, chemically combines to form permanent color.
   1. Color: Cola.
   2. Weight per gallon: 9.5 lbs (4.3kg).
   3. VOC: 0 g/L (Meets final SCAQMD Rule 1113 (2008).

2.3 CONCRETE SEALER

1. Stone Tone Sealer: Acrylic water-based, non-yellowing urethane clear sealer.
2. Solids (By Volume): 30 percent.
3. Gloss: High gloss
4. Resistant to blush.
5. VOC: Less than 50 g/L. Meets final SCAQMD Rule 1113 (2008).
6. Pencil Hardness, ASTM D 3363: 2H.
7. Dry Tape Adhesion, ASTM D 3359: 5A-5B.
8. Dry Time at 70F (21C) with 50 percent RH:
   a. Recoat: 1 hour.
   b. Foot Traffic: 4 hours.
   c. Full Cure: 48 hours.

B. Kemiko Stone Tone Buff-On Wax: Non-yellowing, fast drying, aliphatic petroleum wax.
   1. Dry Time at 70F (21C) with 50 percent RH: 20 -30 Minutes.
   2. Coverage: 250 to 350 sq ft per gallon

C. Sta-Natural: Waterborne silane / siloxane emulsion for sealing stained concrete and other cementitious substrates.
   1. Gloss: Clear flat gloss (Natural Sheen).
   2. Solids (By Volume): 10 percent.
   3. Weight per gallon: 9.5 lbs (4.3kg).
   4. Dry Time at 70F (21C) with 50 percent RH:
      a. Recoat: 1 hour.
      b. Foot Traffic: 4 hours.
      c. Full Cure: 48 hours.
   5. VOC: 0 g/L (Meets final SCAQMD Rule 1113 (2008).

2.4 FLOOR POLISH

A. Easy Shine: Water based acrylic polymer interior floor polish.
   1. Gloss (1 coat at 60F): 90+ (2 thin coats recommended).
   2. Viscosity, CPS at 73 F, RFV., #1 at 20 RPM: Less than 20.
   3. Specific Gravity at 73 F: 8.67.
   4. Solids (By Weight): 20 percent.
   5. Weight per gallon: 9.5 lbs (4.3kg).
   6. Dry Time at 73F (21C) with 40 percent RH: 20 minutes.
   7. VOC: 0 g/L (Meets final SCAQMD Rule 1113 (2008).

2.5 CLEAR TOPCOAT

A. Apply a clear topcoat sealer in accordance with section 09960.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly, in accordance with manufacturer's instructions.

B. Protection:
1. Protect walls and surrounding surfaces not to receive concrete floor stain.
2. Do not allow stain to come in contact with wood or metal surfaces.

C. Prepare concrete surface in accordance with manufacturer's instructions.

D. Concrete shall be as specified in Section 03300. Ensure concrete is a minimum of 28 days old.

E. Ensure surface is clean, dry, structurally sound, and free from dirt, dust, oil, grease, solvents, paint, wax, asphalt, concrete curing compounds, sealing compounds, surface hardeners, bond breakers, adhesive residue, and other surface contaminants.

F. Do not acid wash or use heavy alkali cleaners.

3.3 INSTALLATION - ACID STAINS AND TOPCOATS

A. Install in accordance with manufacturer's instructions.

B. Apply stain in accordance with manufacturer's instructions at locations indicated on the drawings.

C. Control depth of color by adjusting volume of stain applied.

D. Apply 2 coats of stain. Allow to completely dry after each coat. Do not scrub clean between coats.

E. After area has completely dried, scrub off residue in accordance with manufacturer's instructions. Allow to completely dry.

F. Concrete Buff-On Floor Wax: Apply concrete floor wax over interior concrete floor stain in accordance with manufacturer's instructions.

G. Concrete Floor Sealer: Apply concrete floor sealer over concrete floor stain in accordance with manufacturer's instructions.

H. Concrete Floor Polish: Apply floor polish over Stone Tone Sealer in accordance with manufacturer's instructions.

I. Keep material containers closed when not in use to avoid contamination.

3.4 INSTALLATION - REMBRANDT POLYMER STAINS AND TOPCOATS

A. Install in accordance with manufacturers instructions.

B. Concrete Floor Sealer: Apply concrete floor sealer over concrete floor stain in accordance with manufacturer's instructions.

C. Concrete Floor Polish: Apply floor polish over Stone Tone Sealer in accordance with manufacturer's instructions.

D. Keep material containers closed when not in use to avoid contamination.

3.5 PROTECTION

A. Protect stained surfaces from damage during construction.

B. Protect surfaces from foot traffic for a minimum of 24 hours.

C. Do not wash surfaces for a minimum of 48 hours.

END OF SECTION

SECTION 041000 MORTAR AND GROUT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Mortar and grout for masonry.

1.2 RELATED WORK

A. Section 04300 - Unit Masonry System: Installation of mortar and grout.

1.3 REFERENCES

A. American Society for Testing and Materials, (ASTM).

1. ASTM C91-95 - Masonry Cement.
2. ASTM C144-93 - Aggregate for Masonry Mortar.
3. ASTM C150-95 - Portland Cement.
4. ASTM C207 -91 (1992) - Hydrated Lime for Masonry Purposes.
5. ASTM C270-94 - Mortar for Unit Masonry.
6. ASTM C404-95 - Aggregates for Masonry Grout.
7. ASTM C476-95 - Grout for Masonry.
8. ASTM C780-91 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
9. ASTM C1 019-890(1993) - Method of Sampling and Testing Grout.

1.4 SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Contractor's responsibilities:

1. Mix Design: Proportion in conformance with ASTM C476. Indicate if the Proportion or Property Method was used, required environmental conditions, and admixture limitations.
2. Submit manufacturer’s certificate under provisions of Section 01400 that products meet or exceed specified requirements.
3. Submit premix mortar manufacturer's installation instructions.

C. Submit Laboratory's Responsibilities:

1. Submit test reports on mortar indicating conformance to ASTM C270.
2. Submit test reports on grout indicating conformance to ASTM C476.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site, except aggregate, in original and unopened container displaying product name, type, grade, and mixing instructions.

B. Maintain packaged materials clean, dry, and protected against dampness, rain, ground water, freezing, and foreign matter.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperatures to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

1.7 MIX TESTS

A. Testing of Mortar Mix: In accordance with ASTM C780.

B. Test mortar mix for compressive strength, consistency, water content air content.

C. Testing of Grout Mix: In accordance with ASTM C1019.

D. Test mortar mix for compressive strength and slump.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150, Type I, gray color.

B. Masonry Cement: ASTM C91, Type S.

C. Mortar Aggregate: ASTM C144, standard masonry type.

D. Hydrated lime: ASTM C207, Type S.

E. Grout Aggregate: ASTM C404.

1. Fine aggregate: Size #1.
2. Coarse aggregate. When minimum horizontal grout space exceeds 4 inches.
   a. Size #8.

F. Water: Clean and potable.

2.2 MORTAR MIXES

A. Mortar: ASTM C270, Type S using the Property Method.

B. Pointing Mortar: One part masonry cement to one part Type S hydrated lime to four parts aggregate.

2.3 MORTAR MIXING

A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.

B. Exterior masonry walls Elevator and Stair Shafts: Type S, 1800 psi minimum.

C. Interior masonry walls: Type N, 750 psi minimum.

D. Do not use anti-freeze compounds to lower the freezing point of mortar.

E. If water is lost by evaporation, retemper only within two hours of mixing.

F. Use mortar within two hours after mixing at temperatures of 80 degrees F or two-and-one-half hours at temperatures under 50 degrees F.

2.4 GROUT MIXES

A. Bond Beams Lintels: 2500 psi strength at 28 days; 7-8 inches slump; mixed in accordance with ASTM C476 Course grout.

B. Engineered Masonry: 2500 psi strength at 28 days; 7-8 inches slump; mixed in accordance with ASTM C476 Fine Course grout.

2.5 GROUT MIXING

A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C476 Fine Course grout.

B. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Request inspection of spaces to be grouted.

3.2 PREPARATION

A. Plug cleanout holes with masonry units to prevent leakage of grout materials. Brace masonry for wet grout pressure.

3.3 INSTALLATION

A. Install mortar and grout to requirements of the specific masonry Section.

B. Work grout into masonry cores and cavities to eliminate voids.

1. Use fine grout where minimum horizontal grout space is less than 4 inches.
2. Use course grout where minimum horizontal grout space is equal to or greater than 4 inches.

C. Do not displace reinforcement while placing grout.

END OF SECTION

SECTION 044300 - STONE MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following applications of stone masonry:
   1. Anchored to unit masonry backup.
   2. Anchored to cold-formed metal framing and sheathing.

B. Products installed, but not furnished, in this Section include:

   1. Steel lintels and shelf angles for stone masonry specified in Division 05 Section "Metal Fabrications."

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

   1. For stone varieties proposed for use on Project, include test data indicating compliance with physical properties required by referenced ASTM standards.

B. Samples:

   1. For each stone type indicated.
   2. For each color of mortar required.

1.3 PROJECT CONDITIONS

A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work.

B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried.

C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 LIMESTONE

A. Limestone: Comply with ASTM C 568.

1. Products: Subject to compliance with requirements, provide the following:
   a. Submit limestone samples for architects approval from their full range of products.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Masonry Cement: ASTM C 91.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in stone masonry mortar.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Davis Colors; True Tone Mortar Colors.
   b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
   c. Solomon Colors; SGS Mortar Colors.

E. Colored Cement Product: Packaged blend made from Portland cement and lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Colored Portland Cement-Lime Mix:

      1) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
      2) Lafarge North America; Eaglebond.

3) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

b. Colored Masonry Cement:

1) Essroc, Italcementi Group; Brixment-in-Color.
2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Masonry Cement.
3) Lehigh Cement Company; Lehigh Custom Color Masonry Cement.

F. Aggregate: ASTM C 144 and as follows:

1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 sieve.
2. White Aggregates: Natural white sand or ground white stone.
3. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

G. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gauging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed Portland cement mortar bed, and not containing a retarder.

1. 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:

a. Boiardi Products Corporation.
b. Bonsal.
c. Bostik Findley Inc.
d. C-Cure.
e. Custom Building Products.
f. DAP Inc.
g. Laticrete International, Inc.
h. MAPEI Corp.
i. Summitville Tiles, Inc.
j. TEC Specialty Construction Brands; H. B. Fuller Company.

H. Water: Potable.

2.3 VENEER ANCHORS

A. Materials:

1. Hot-Dip Galvanized-Steel Wire: ASTM A 82, with ASTM A 153/A 153M, Class B-2.
2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 316.

3. Hot-Dip Galvanized-Steel Sheet: ASTM A 1008/A 1008M, cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M, Class B-2.
4. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 316.

B. Wire Veneer Anchors: Wire ties formed from W1.7 or 0.148-inch- diameter, stainless-steel wire.

C. Corrugated-Metal Veneer Anchors: Not less than 0.030-inch- thick by 7/8-inch-wide stainless-steel sheet with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch.

D. Adjustable, Screw-Attached Veneer Anchors: Units consisting of a wire tie section and a metal anchor section that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Dur-O-Wal, a Dayton Superior Company; D/A 213 r D/A 210 with D/A 700-708.
    b. Heckmann Building Products Inc.; 315-D with 316.
    c. Hohmann & Barnard, Inc.; DW-10 DW-10HS or DW-10-X.
    d. Wire-Bond; 1004, Type III or RJ-711.

2. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
3. Anchor Section: Sheet metal plate, with screw holes top and bottom and with raised rib-stiffened strap stamped into center to provide a slot between strap and plate for inserting wire tie.
4. Fabricate sheet metal anchor sections and other sheet metal parts from 0.078-inch- thick, stainless-steel sheet.
5. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.25-inch- diameter, stainless-steel wire.

E. Seismic Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in stone masonry mortar joint.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Dur-O-Wal, a Dayton Superior Company; D/A 213S.
    b. Hohmann & Barnard, Inc.; DW-10-X-Seismiclip.
    c. Wire-Bond; RJ-711 with Wire-Bond Clip.

2. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
3. Anchor Section: Gasketed sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes top and bottom; and raised rib-stiffened strap, 5/8 inch wide by 6 long, stamped into center to provide a slot between strap and plate for inserting wire tie.
4. Connector Section: Triangular wire tie and rigid PVC extrusion with snap-in grooves for inserting continuous wire.
5. Fabricate sheet metal anchor sections and other sheet metal parts from 0.109-inch- thick, stainless-steel sheet.
6. Fabricate wire connector sections from 0.25-inch- diameter, stainless-steel wire.
7. Continuous Wire: 0.188-inch- diameter, stainless-steel wire.

2.4 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with SMACNA's "Architectural Sheet Metal Manual and as follows:

1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch thick.
2. Copper: ASTM B 370, Temper H00 or H01, cold-rolled copper sheet, 10-oz./sq. ft. weight or 0.0135 inch thick for fully concealed flashing; 16-oz./sq. ft. weight or 0.0216 inch thick elsewhere.

B. Flexible Flashing: For flashing not exposed to the exterior, use one of the following unless otherwise indicated:

1. Copper-Laminated Flashing: 5-oz./sq. ft. copper sheet bonded with asphalt between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Advanced Building Products Inc.; Copper Fabric Flashing.
2) Hohmann & Barnard, Inc.; H & B C-Fab Flashing.
3) Phoenix Building Products; Type FCC-Fabric Covered Copper.
4) Polytite Manufacturing Corporation; Copper Fabric Flashing.
5) Sandell Manufacturing Co., Inc.; Copper Fabric Flashing.
6) York Manufacturing, Inc.; York Copper Fabric Flashing.

2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Advanced Building Products Inc.; Peel-N-Seal.
2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
3) Dur-O-Wal, a Dayton Superior Company; Dur-O-Barrier-44.
4) Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
5) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
6) Hohmann & Barnard, Inc.; Textroflash.
7) Polyguard Products, Inc.; Polyguard 300.
8) Polytite Manufacturing Corporation; Poly-Barrier Self-Adhering Wall Flashing.
9) Williams Products, Inc.; Everlastic MF-40.

2.5 MISCELLANEOUS MASONRY ACCESSORIES

A. Cementitious Dampproofing: Cementitious formulations that are recommended by ILI and that are non-staining to stone, compatible with joint sealants, and noncorrosive to veneer anchors and attachments.

B. Asphalt Dampproofing: Cut-back asphalt complying with ASTM D 4479, Type I or asphalt emulsion complying with ASTM D 1227, Type III or IV.

C. Weep Hole/Vent Products: Use one of the following unless otherwise indicated:
1. Round Plastic Tubing: Medium-density polyethylene, 3/8-inch OD by thickness of stone masonry.

D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Provide the following configuration:

a. Strips, full-depth of cavity and 10 inches wide, with dovetail shaped notches 7 inches deep.

2. Products: Subject to compliance with requirements, provide one of the following:

a. Advanced Building Products Inc.; Mortar Break.
b. CavClear/Archovations, Inc.; CavClear Masonry Mat.
c. Dur-O-Wal, a Dayton Superior Company; Polytite MortarStop.
d. Mortar Net USA, Ltd.; Mortar Net.

E. Expanded Metal Lath: 3.4 lb/sq. yd., self-furring, diamond-mesh lath complying with ASTM C 847. Fabricate from structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G60.

F. Welded-Wire Lath: ASTM C 933, fabricated into 2-by-2-inch mesh with minimum 0.0625-inch- diameter, galvanized-steel wire.

2.6 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.

1. 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:

a. Diedrich Technologies, Inc.
b. Dominion Restoration Products.
c. EaCo Chem, Inc.
d. Hydrochemical Techniques, Inc.
e. Prosoco, Inc.

2.7 MORTAR MIXES

A. General: Do not use admixtures unless otherwise indicated.

1. Do not use calcium chloride.
2. Limit cementitious materials in mortar to portland cement and lime.
3. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.

1. Mortar for Setting Stone: Type N.
2. Mortar for Pointing Stone: Type N.

C. Latex-Modified Portland Cement Setting Mortar: Proportion and mix Portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions.

D. Cement-Paste Bond Coat: Mix either neat cement and water or cement, sand, and water to a consistency similar to that of thick cream.

1. For latex-modified Portland cement setting-bed mortar, substitute latex admixture for part or all of water, according to latex-additive manufacturer's written instructions.

E. Mortar for Scratch Coat over Metal Lath: 1 part Portland cement, 1/2 part lime, 5 parts loose damp sand, and enough water to produce a workable consistency.

F. Mortar for Scratch Coat over Unit Masonry: 1 part Portland cement, 1 part lime, 7 parts loose damp sand, and enough water to produce a workable consistency.

G. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of Portland cement by weight.
2. Pigments shall not exceed 5 percent of masonry cement by weight.

2.8 FABRICATION

A. Select stone to produce pieces of thickness, size, and shape indicated, including details on Drawings. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated.

B. Gage backs of stones for adhered veneer if more than 81 sq. in. in area.

C. Shape stone for type of masonry (pattern) as follows:
1. Split-bed, random-range ashlar with random course heights and random lengths (interrupted coursed).

D. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.

1. Finish: Split face.
2. Finish for Sills: Smooth.
3. Finish for Lintels: Smooth.
4. Finish for Copings: Smooth.

a. Finish exposed ends of copings same as front and back faces.

PART 3 - EXECUTION

3.1 PREPARATION

A. Accurately mark stud centerlines on face of weather-resistant sheathing paper before beginning stone installation.

B. Coat concrete and unit masonry backup with asphalt dampproofing.

3.2 SETTING OF STONE MASONRY, GENERAL

A. Perform necessary field cutting and trimming as stone is set.

1. Use power saws to cut stone that is fabricated with saw-cut surfaces.
2. Use hammer and chisel to split stone that is fabricated with split surfaces.

B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.

C. Arrange stones in broken-range ashlar pattern with uniform course heights, random lengths, and uniform joint widths.

D. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.

E. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 3/8 inch at narrowest points or more than 1/2 inch at widest points.

F. Provide sealant joints of widths and at locations indicated.

1. Keep sealant joints free of mortar and other rigid materials.
2. Sealing joints is specified in Division 07 Section "Joint Sealants."

G. Install embedded flashing and weep holes at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

1. At stud-framed walls, extend flashing through stone masonry, up the face of sheathing at least 12 inches, and behind weather-resistant sheathing paper.
2. At multiwythe masonry walls, including cavity walls, extend flashing through stone masonry, turned up a minimum of 12 inches, and extend into or through inner wythe to comply with requirements in Division 04 Section "Unit Masonry."
3. At concrete backing, extend flashing through stone masonry, turned up a minimum of 8 inches, and insert in reglet. Reglets are specified Division 07 Section "Sheet Metal Flashing and Trim."
4. At lintels and shelf angles, extend flashing full length of angles but not less than 6 inches into masonry at each end.
5. At sills, extend flashing not less than 4 inches at ends.
6. At ends of head and sill flashing turn up not less than 2 inches to form end dams.
7. Extend sheet metal flashing 1/2 inch beyond face of masonry at exterior and turn flashing down to form a drip.

8. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
9. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
10. Cut flexible flashing flush with face of wall after masonry wall construction is completed.

H. Coat limestone with cementitious dampproofing as follows:

1. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches above finish-grade elevations.
2. Stone Extending below Grade: Beds, joints, back surfaces, and face surfaces below grade.

I. Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, and at flashing.

1. Use wicking material or open head joints to form weep holes.
2. Use wicking material to form weep holes above flashing in stone sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches o.c.
4. Space weep holes formed from wicking material 16 inches o.c.
5. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.
6. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

J. Install vents in vertical head joints at the top of each continuous cavity at spacing indicated. Use open head joints to form vents.

3.3 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet or more.

3.4 INSTALLATION OF ANCHORED STONE MASONRY

A. Anchor stone masonry to concrete with corrugated-metal veneer anchors unless otherwise indicated. Secure anchors by inserting dovetailed ends into dovetail slots in concrete.

B. Anchor stone masonry to unit masonry with corrugated-metal veneer anchors unless otherwise indicated. Embed anchors in unit masonry mortar joints or grouted cells for distance at least one-half of unit masonry thickness.

C. Anchor stone masonry to stud framing with adjustable, screw-attached veneer anchors unless otherwise indicated. Fasten anchors through sheathing to framing with two screws.

D. Embed veneer anchors in mortar joints of stone masonry at least halfway, but not less than 1-1/2 inches, through stone masonry and with at least 5/8-inch cover on outside face.

1. Install continuous wire reinforcement in horizontal joints and attach to seismic veneer anchors as stone is set.

E. Space anchors to provide not less than 1 anchor per 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings, sealant joints, and perimeter at intervals not exceeding 12 inches.

F. Space anchors not more than 16 inches o.c. vertically and 24 inches o.c. horizontally. Install additional anchors within 12 inches of openings, sealant joints, and perimeter at intervals not exceeding 12 inches.

G. Set stone in full bed of mortar with full head joints unless otherwise indicated. Build anchors into mortar joints as stone is set.

H. Provide 2-inch cavity between stone masonry and backup construction unless otherwise indicated. Keep cavity free of mortar droppings and debris.

1. Place mortar spots in cavity at veneer anchors to maintain spacing.
2. Slope beds toward cavity to minimize mortar protrusions into cavity.

I. Rake out joints for pointing with mortar to depth of not less than 3/8 inch. Rake joints to uniform depths with square bottoms and clean sides.

3.5 POINTING

A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch deep until a uniform depth is formed.

B. Point stone joints by placing and compacting pointing mortar in layers not more than 3/8 inch deep. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.

C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:

1. Joint Profile: Smooth, flat face slightly below edges of stone.

3.6 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
5. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised II, using job-mixed detergent solution.
6. Clean stone masonry with proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean limestone masonry to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.7 EXCESS MATERIALS AND WASTE

A. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches of finished grade.

END OF SECTION 044300

SECTION 057000 - DECORATIVE METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal fasteners at wood columns.

B. Related Sections:

1. Division 06 Section "Exterior Finish Carpentry"

1.2 SUBMITTALS

A. Product Data: For each type of product indicated, including finishing materials.

B. Shop Drawings: Show fabrication and installation details. Indicate materials, finishes, fasteners, anchorages, and accessory items.

C. Samples: For each type of exposed finish required.

PART 2 - PRODUCTS

2.1 STEEL AND IRON

A. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

B. Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M unless otherwise indicated.

D. Steel Sheet, Cold Rolled: ASTM A 1008/A 1008M, either commercial steel or structural steel, exposed.

2.2 FASTENERS

A. Fastener Materials: Unless otherwise indicated, provide the following:
1. Stainless-Steel Items: Stainless-steel fasteners.
2. Steel Items: Plated steel fasteners with ASTM B 633, Class Fe/Zn 25 electrodeposited zinc coating unless otherwise indicated.
3. Dissimilar Metals: Stainless-steel fasteners.

B. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

2.3 MISCELLANEOUS MATERIALS

A. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Universal Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FABRICATION, GENERAL

A. Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.

B. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.

C. Comply with AWS for recommended practices in shop welding and brazing. Weld and braze behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.

1. Where welding and brazing cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 Welds: no evidence of a welded joint.

D. Provide castings that are sound and free of warp, cracks, blowholes, or other defects that impair strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks.

2.5 FINISHES, GENERAL

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

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

2.6 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize products made from rolled, pressed, and forged steel shapes, castings, plates, bars, and strips indicated to be galvanized to comply with ASTM A 123/A 123M.

1. Hot-dip galvanize steel and iron hardware indicated to be galvanized to comply with ASTM A 153/A 153M.

B. Preparing Galvanized Items for Shop Priming: After galvanizing, thoroughly clean decorative metal of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

C. Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Primer Application: Apply shop primer to prepared surfaces of items unless otherwise indicated. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated ferrous-metal surfaces with universal shop primer

2. Retain subparagraph below if galvanized items are not shop primed.
3. Do not apply primer to galvanized surfaces.

E. Powder-Coat Finish: Prepare, treat, and coat ferrous metal to comply with resin manufacturer's written instructions and as follows:

1. Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Prepare galvanized metal by thoroughly removing grease, dirt, oil, flux, and other foreign matter.
3. Treat prepared metal with metallic-phosphate pretreatment, rinse, and seal surfaces.
4. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm).
5. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide anchorage devices and fasteners where needed to secure decorative metal to in-place construction.

B. Set products accurately in location, alignment, and elevation, measured from established lines and levels.

C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals and spaces for sealants and joint fillers.

D. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

E. Install concealed gaskets, joint fillers, insulation, and flashings as work progresses.

F. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work.

G. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

END OF SECTION 057000

SECTION 060670 PLASTIC AND METAL SURFACING MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Standard Decorative Laminates.

B. Custom Decorative Laminates.

C. Metal Laminates.

1.2 RELATED SECTIONS

A. Section: Finish Carpentry.

1.3 REFERENCES

A. ANSI Z124.6 - Plastic Sinks.

B. ASTM D 256 - Standard Test Method for Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.

C. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.

D. ASTM D 696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C.

E. ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

F. ASTM D 785 - Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials.

G. ASTM D 2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Compressor.

H. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

I. ASTM G 22 - Standard Practice for Determining Resistance of Plastics to Bacteria.

J. NEMA LD 3 current revision- High Pressure Decorative Laminates; National Electrical Manufacturers Association.

K. ISO 4586-2 - High Pressure Decorative Laminates; International Organization for Standardization.

1.4 SUBMITTALS

A. Submit under provisions of Section: Submittals.

B. Samples:
1. Verification Samples: Submit two samples, each 12 inches square, illustrating each selected surfacing material in specified color, pattern, and finish.

C. Manufacturer's Instructions:
1. Submit manufacturer's printed installation instructions for each product.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store surfacing materials to prevent breakage and marring of surfaces in accordance with manufacturer's printed instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Wilsonart International, 2400 Wilson Place, P. O. Box 6110, Temple, TX 76503-6110; Tel: (254) 207-7000, Fax: (254) 207-2384, Response Line: (800)433-3222. email: smartline@wilsonart.com website: www.wilsonart.com

2.2 STANDARD DECORATIVE LAMINATES

A. Acceptable Product: Wilsonart Laminate.

B. Product Description: Decorative surface papers, impregnated with melamine resins, bonded under heat and pressure to kraft papers impregnated with phenolic resins.

C. Standard Decorative Laminate - General Purpose Type: Wilsonart Type 107, having the following physical characteristics:
1. Sheet thickness: 0.048 inch nominal (1.22mm)
2. Exceeding performance requirements of NEMA LD 3 current revision Grade HGS.
3. Surface burning characteristics in accordance with ASTM E 84; unbonded.
4. Patterns and Finishes: Indicated on drawings.

D. Standard Decorative Laminate - Vertical Surface Type: Wilsonart Type 335, having the following physical characteristics:
1. Sheet thickness: 0.028 inch nominal (0.71 mm)
2. Exceeding performance requirements of NEMA LD 3 current revision Grade VGS and VGP.
3. Surface burning characteristics in accordance with ASTM E 84; unbonded.
4. Patterns and Finishes: Indicated on drawings.

E. Standard Decorative Laminate - Postforming Type:

Wilsonart Type 350, having the following physical characteristics:

1. Sheet thickness: 0.039 inch nominal (1.00 mm).
2. Exceeding performance requirements of NEMA LD 3 current revision Grade HGP.
3. Surface burning characteristics in accordance with ASTM E 84; unbonded.
4. Patterns and Finishes: Indicated on drawings.

2.3 CUSTOM DECORATIVE LAMINATES

A. Acceptable Product: Wilsonart Custom Laminates.

B. Product Description: Decorative surface papers, impregnated with melamine resins, bonded under heat and pressure to kraft papers impregnated with phenolic resins.

C. Custom Decorative Laminate - General Purpose Type: Type 173 or 174.

1. Sheet thickness: 0.048 inch nominal (1.22).
2. Exceeding performance requirements of NEMA LD 3 current revision Grade HGS.
3. Patterns and Finishes: Indicated on drawings.

D. Custom Decorative Laminate - Vertical Surface Type: Type 363 or 364.

1. Sheet thickness: 0.028 inch nominal (0.71 mm).
2. Exceeding performance requirements of NEMA LD 3 current revision Grade VGP.
3. Pattern: Patterns and Finishes: Indicated on drawings.

2.5 ACCESSORY MATERIALS

A. Adhesives: Provide types as specified in manufacturer's printed installation instructions.

PART 3 EXECUTION

3.1 PREPARATION

A. Surface preparation: Precondition surfacing materials and surfaces to receive surfacing materials in accordance with manufacturer's printed installation instructions.

END OF SECTION

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Rooftop equipment bases and support curbs.
4. Wood blocking and nailers.
5. Wood furring.
6. Wood sleepers.
7. Plywood backing panels.

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

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

B. 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 American Lumber Standards Committee Board of Review.

C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Power-driven fasteners.
5. Powder-actuated fasteners.
6. Expansion anchors.
7. Metal framing anchors.

1.3 QUALITY ASSURANCE

A. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":

1. Dimension lumber framing.
2. Laminated-veneer lumber.
3. Prefabricated wood I-joists.
4. Rim boards.
5. Miscellaneous lumber.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC 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.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, which meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

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

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat all rough carpentry, unless otherwise indicated.

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 framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood).

1. Use Exterior type for exterior locations and where indicated.
2. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
3. Use Interior Type A, unless otherwise indicated.

B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

C. Application: Treat all rough carpentry, unless otherwise indicated.
1. Concealed blocking.
2. Framing for non-load-bearing partitions.
3. Framing for non-load-bearing exterior walls.
4. Roof construction.
5. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 19 percent.

B. Non-Load-Bearing Interior Partitions: Standard, Stud, or No. 2 grade of any species.

C. Framing Other Than Non-Load-Bearing Interior Partitions: No. 2 Construction grade and the following species:

1. Hem-fir (north); NLGA.
2. Southern pine; SPIB.
3. Douglas fir-larch; WCLIB or WWPA.
4. Mixed southern pine; SPIB.
5. Spruce-pine-fir; NLGA.
6. Douglas fir-south; WWPA.
7. Hem-fir; WCLIB or WWPA.

8. Douglas fir-larch (north); NLGA.
9. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

D. Framing Other Than Non-Load-Bearing Interior Partitions: Any species and grade with a modulus of elasticity of at least 1,500,000 psi (10 350 MPa) and an extreme fiber stress in bending of at least 1000 psi (6.9 MPa) for 2-inch nominal (38-mm actual) thickness and 12-inch nominal (286-mm actual) width for single-member use.

E. Exposed Exterior Framing Indicated to Receive a Stained Finish: 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 and Grade: As indicated above for load-bearing construction of same type.
2. Species and Grade: Southern pine, No. 1 grade; SPIB.
3. Species and Grade: Douglas fir-larch; No. 1 grade; WCLIB, or WWPA.
4. Species and Grade: Mixed southern pine, No. 1 grade; SPIB.
5. Species and Grade: Spruce-pine-fir, No. 1 grade; NLGA.
6. Species and Grade: Douglas fir-south; No. 1 grade; WWPA.
7. Species and Grade: Hem-fir; No. 1 grade; WCLIB, or WWPA.
8. Species and Grade: Spruce-pine-fir (south), No. 1 grade; NeLMA, WCLIB, or WWPA.
9. Species and Grade: Eastern hemlock-balsam fir or Eastern hemlock-tamarack; No. 1 grade; NeLMA.
10. Species and Grade: Redwood, Select Structural grade; RIS.
11. Species and Grade: Western cedars, Select Structural grade; WCLIB, or WWPA.

2.5 ENGINEERED WOOD PRODUCTS

A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559 and containing no urea formaldehyde.

1. Extreme Fiber Stress in Bending, Edgewise: 3100 psi (21.3 MPa) 12-inch nominal- (286-mm actual-) depth members.
2. Modulus of Elasticity, Edgewise: 2,000,000 psi (13 700 MPa)

2.6 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. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.

C. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Eastern softwoods, No. 2 Common grade; NeLMA.
3. Northern species, No. 2 Common grade; NLGA.
4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

2.7 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exterior, C-C Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.8 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified.

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 A 153/A 153M.

B. Power-Driven Fasteners: NES NER-272.

C. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

2.9 METAL FRAMING ANCHORS

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:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings or comparable products by one of the following:

1. Alpine Engineered Products, Inc.
2. Cleveland Steel Specialty Co.
3. Harlen Metal Products, Inc.
4. KC Metals Products, Inc.
5. Simpson Strong-Tie Co., Inc.
6. Southeastern Metals Manufacturing Co., Inc.
7. USP Structural Connectors.

D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, which meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

E. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

2.10 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.

B. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

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 AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

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

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

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.

3.2 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 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Wall sheathing.
2. Roof sheathing.
3. Composite nail base insulated roof sheathing.
4. Subflooring.
5. Underlayment.
6. Building paper.
7. Building wrap.
8. Sheathing joint-and-penetration treatment.
9. Flexible flashing at openings in sheathing.

1.2 SUBMITTALS

A. 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.

B. Research/Evaluation Reports: For the following:

1. Preservative-treated plywood.
2. Fire-retardant-treated plywood.
3. Foam-plastic sheathing.
4. Building wrap.

1.3 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 E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

B. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":

1. Plywood.
2. Oriented strand board.
3. Particleboard underlayment.
4. Hardboard underlayment.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack 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 WOOD PANEL PRODUCTS, GENERAL

A. Plywood: DOC PS 1, unless otherwise indicated.

B. Oriented Strand Board: DOC PS 2.

2.2 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA C9.

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

C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Comply with performance requirements in AWPA C27.

1. Use Exterior type for exterior locations and where indicated.
2. Use Interior Type A, High Temperature (HT) for roof sheathing and where indicated.
3. Use Interior Type A, unless otherwise indicated.

B. Kiln-dry material after treatment to a maximum moisture content of 15 percent.

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 authorities having jurisdiction.

D. Application: Treat all plywood, unless otherwise indicated.

2.4 WALL SHEATHING

A. Plywood Wall Sheathing: Exterior sheathing.

B. Oriented-Strand-Board Wall Sheathing: Exposure 1, Structural I sheathing.

C. Extruded-Polystyrene-Foam Wall Sheathing: ASTM C 578, Type IV, with tongue-and-groove or shiplap long edges as standard with manufacturer.

1. Thickness: 1 inch (25 mm).

D. Foil-Faced, Polyisocyanurate-Foam Wall Sheathing: ASTM C 1289, 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: 1 inch (25 mm).

2.5 ROOF SHEATHING

A. Plywood Roof Sheathing: Exterior sheathing.

B. Oriented-Strand-Board Roof Sheathing: Exposure 1, Structural I sheathing.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated.

1. For wall and roof sheathing panels, provide fasteners with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

2.7 WEATHER-RESISTANT SHEATHING PAPER

A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), un-perforated.

B. Building Wrap: ASTM E 1677, Type I air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Chemical Company (The); Styrofoam Weathermate Plus Brand Housewrap.
b. DuPont (E. I. du Pont de Nemours and Company); Tyvek Commercial Wrap and Header Wrap.
c. Ludlow Coated Products; Barricade Building Wrap.
d. Pactiv, Inc.; GreenGuard Ultra Wrap.
e. Raven Industries Inc.; Rufco-Wrap.
f. Reemay, Inc.; Typar HouseWrap.

3. Water-Vapor Permeance: Not less than 152 g through 1 sq. m of surface in 24 hours per ASTM E 96, Desiccant Method (Procedure A).

C. Building-Wrap Tape: Tape recommended by building-wrap manufacturer.

2.8 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sheathing Tape for Foam-Plastic Sheathing: Tape recommended by sheathing manufacturer.

2.9 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use indicated by manufacturers of both adhesives and panels.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's "Uniform Building Code."
4. Table 2305.2, "Fastening Schedule," in BOCA's "BOCA National Building Code."
5. Table 2306.1, "Fastening Schedule," in SBCCI's "Standard Building Code."
6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."

7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's "International One- and Two-Family Dwelling Code."

B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that exclude exterior moisture.

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

3.2 WEATHER-RESISTANT SHEATHING-PAPER INSTALLATION

A. General: Cover sheathing with weather-resistant sheathing paper as follows:

1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap, unless otherwise indicated.

B. Building Paper: Apply horizontally with a 2-inch (50-mm) overlap and a 6-inch (150-mm) end lap; fasten to sheathing with galvanized staples or roofing nails.

C. Building Wrap: Comply with manufacturer's written instructions.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

3.3 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed tape in sealant. Apply sealant to exposed fasteners. Seal other penetrations and openings.
3. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

3.4 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

1. Lap seams and junctures with other materials at least 4 inches (100 mm), except that at flashing flanges of other construction, laps need not exceed flange width.

2. Lap flashing over weather-resistant building paper at bottom and sides of openings.
3. Lap weather-resistant building paper over flashing at heads of openings.
4. After flashing has been applied, roll surfaces with a hard rubber or metal roller.

3.5 PROTECTION

A. Paper-Surfaced Gypsum Sheathing: Protect sheathing by covering exposed exterior surface of sheathing with weather-resistant sheathing paper securely fastened to framing. Apply covering immediately after sheathing is installed.

END OF SECTION 061600

SECTION 062000 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Construction Agreement and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1 . Exterior wood trim
   2. Interior standing and running trim.

B. Related Sections include the following:
   1 . Division 6 Section "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view and for structural wood decking and framing exposed to view.
   2. Division 9 Section "Painting" for priming and bock-priming of finish carpentry.

1.3 DEFINITIONS

A. Inspection agencies, and the abbreviations used to reference them, include the following:
   1. NEIMA - Northeastern lumber Manufacturers Association.
   2. NHLA - National Hardwood lumber Association.
   3. NIGA - Notional lumber Grades Authority.
   4. SCMA - Southern Cypress Manufacturers Association.
   5. SPIB - Southern Pine Inspection Bureau.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Include construction details, material
   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, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
   2. Provide a statement that moisture content of products receiving a waterborne treatment was reduced to levels specified before shipment to Project site.

B. Samples for Verification: Submit lumber samples to Owner's representative for acceptance.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed architectural woodwork 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.

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

C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.
B. Deliver interior finish carpentry only when environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.7 PROJECT CONDITIONS
A. Environmental Limitations: Do not deliver or install interior finish carpentry 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. Weather limitations: Proceed with installation only when existing and forecasted weather conditions permit work to be performed according to manufacturers written instructions and warranty requirements and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL
A. lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by the American lumber Standards' Committee Boord of Review.
1. Factory mark each piece of lumber with grade stomp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
B. Softwood Plywood: DOC PS 1.
C. Hardwood Plywood: HPV A HP- 1.
D. Medium-Density Fiberboard: ANSI A208.2, Grode MD-Exterior Glue. GeorgiaPacific "Synergite".
E. Wood Species for Interior Opaque Finish: Medium density fiberboard, or any c1osed - grain hardwood, poplar, or southern pine.

2.2 WOOD-PRESERVATIVE- TREATED MATERIALS
A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).
B. Preservative Chemicals: Acceptable to authorities having jurisdiction and one of the following:
1. Chromated copper arsenate (CCA).
2. Ammoniacal copper quat (ACQ).
3. Copper bis (dimethyldithiocarbamate) (CDDC).
4. Ammoniacal copper citrate (CC).
5. Copper azole, Type A (CBA-A).
6. Oxine copper (copper-8-quinolinolate) in a light petroleum solvent.
C. Do not use chemical formulations that require incising.
D. 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.
E. Pressure-treat aboveground items with preservatives to a minimum retention of 0.25 pounds per cubic foot.
F. Kiln-dry exposed, finished lumber after treatment to a maximum moisture content of 1 5 percent.

G. Mark each treated item with the Quality Mark Requirements of on inspection agency approved by the American Lumber Standards' Committee Board of Review.

2.3 EXTERIOR WOOD FOR OPAQUE FINISH

A. Quality Standard: Comply with AWl Section 300.
B. Grade: Custom.
C, Block-out or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
D. lumber Trim: solid lumber with surfaced (smooth) face and of the following species and grade:
E. Wood Species and Grade for Opaque Finish: No.2 & Better Grade cypress, graded in accordance with Standard Specifications for Grades of Southern Cypress from the Southern Cypress Manufacturers Association, and the Rules for the Measurement and Inspection of Hardwood & Cypress from the National Hardwood Lumber Association.
F. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches wide.

2.4 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. lumber Trim for Opaque Finish (Painted): Finished lumber (S4S), either finger jointed or solid lumber, of one of the following species and grades:
B. Medium density fiberboard
C. Grade Finish or 1 Common eastern white pine; NELMA or NlGA.
D. Grade B Finish older, aspen, basswood, cottonwood, gum, magnolia, soft maple, sycamore, tupelo, or yellow poplar; NHLA.

Moldings: Made to patterns included in WMMPA WM 7. Wood moldings made from kiln-dried stock and graded under WMMPA WM 4.

2.5 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide stainless steel nails or screws in sufficient length to penetrate minimum of 1-1/2 inches into substrate, unless otherwise recommended by manufacturer.
B. 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.
C. Glue: Aliphatic- or phenolic-resin wood glue recommended by manufacturer for general carpentry use.
D. Flashing: Comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim" for flashing materials installed in finish carpentry.
E. Horizontal Joint Flashing for Siding: Preformed prefinished aluminum Z-shaped f1ashing .020 inch thick.
F. Color to be selected by the architect from the manufacturer's standard colors.
G. Sealants: Comply with requirements in Division 7 Section "Joint Sealants" for materials required for sealing siding work.

2.8 FABRICATION

A. Wood Moisture Content: Comply with requirements of specified inspection agencies and with manufacturer's written recommendations for moisture content of finish carpentry at relative humidity conditions existing during time of fabrication and in installation areas.
B. Back out or kerf backs of the following members except members with ends exposed in finished work:
   1 . Exterior standing and running trim wider than 5 inches.
C. Interior standing and running trim except shoe and crown molds.
D. Wood board paneling.

E. Ease edges of lumber less than 1 inch in nominal thickness to 1 /16-inch radius and edges of lumber 1 inch or more in nominal thickness to l/8-inch 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. 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 finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours, but not less than the conditioning period recommended by manufacturer.
C. Prime lumber for exterior applications to be painted. Prime both front and back sides and edges. Cut to required lengths and prime ends. Comply with requirements in Division 9 Section "Pointing."

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
   1. Do not use manufactured units with defective surfaces, sizes, or patterns.
B. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
C. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
D. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.
E. 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.
F. Install stairs with no more than 3/16-inch variation between adjacent treads and risers and with no more than 3lB-inch variation between largest and smallest treads and risers within each flight.
G. Coordinate finish carpentry with materials and systems in or adjacent to it.
H. Provide cutouts for mechanical and electrical items that penetrate finish carpentry.

3.4 STANDING AND RUNNING 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 necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane blocks of casings to provide uniform thickness across joints, where necessary for alignment.
   1. Match color and grain pattern across joints.
B. Install trim after gypsum board joint finishing operations are completed.
C. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.
D. Fit exterior joints to exclude water. Apply flat grain lumber with bark side exposed to weather.

3.5 ADJUSTING

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

B. Finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

A. Clean finish carpentry on exposed and semi-exposed surfaces. Touch up factory applied finishes restoring damaged or soiled areas.

END OF SECTION 062000

SECTION 062013 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior standing and running trim.
2. Lumber Hardboard siding.
3. Hardboard soffits.

B. See Division 06 Section "Exterior Architectural Woodwork" for shop-fabricated exterior woodwork

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

B. Samples: For each type of siding indicated.

1.3 QUALITY ASSURANCE

A. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":

1. Exterior standing and running trim.
2. Exterior lumber hardboard siding.
3. Exterior hardboard soffits.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.

B. Softwood Plywood: DOC PS 1.

C. Hardboard: AHA A135.4.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process:

1. Lumber: AWPA C2. Kiln dry after treatment to a maximum moisture content of 19 percent.
2. Plywood: AWPA C9. Kiln dry after treatment to a maximum moisture content of 18 percent.
3. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium].
4. Application: Where indicated

2.3 STANDING AND RUNNING TRIM

A. Lumber Trim:
1. Species and Grade: Western red cedar, Grade A; NLGA, WCLIB, or WWPA.
2. Maximum Moisture Content: 15 percent.
3. Face Surface: Surfaced (smooth).

B. Moldings: WMMPA WM 4, N-grade wood moldings, without finger jointing. Made from kiln-dried stock to patterns included in WMMPA WM 12.

1. Species: Western red cedar.

2.4 HARDBOARD SIDING

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:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Collins Products LLC; Collins Companies, Inc. (The).
2. Georgia-Pacific Corp.
3. Louisiana-Pacific Corporation.
4. Temple-Inland Inc.

C. Hardboard Siding: AHA A135.6, primed with manufacturer's standard exterior primer.

1. Type: 7/16-inch- (11-mm-) thick-by-[6-inch- (152-mm-)] [8-inch- (203-mm-)] wide lap siding.
2. Type: 1/2-inch- (12.7-mm-) thick-by-8-inch- (203-mm-) wide, beaded-edge lap siding.
3. Type: 7/16-inch- (11-mm-) thick, square-edge flat panels; without grooves.
4. Type: 7/16-inch- (11-mm-) thick, shiplap-edge panels; channel grooved with grooves 8 inches (203.2 mm) o.c.
5. Texture: Wood grain.

2.5 HARDBOARD SOFFITS

A. Hardboard Soffits: Primed hardboard, complying with AHA A135.6, with manufacturer's standard exterior primer.

1. Type: 1/2-inch- (12.7-mm-) thick flat panels, smooth.

2.6 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.

1. For prefinished items, provide matching prefinished aluminum fasteners where face fastening is required.
2. For applications not otherwise indicated, provide hot-dip galvanized steel or aluminum fasteners.

B. Insect Screening for Soffit Vents: Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh.

C. Round Soffit Vents: Stamped aluminum louvered vents, 4 inches (102 mm) in diameter.

D. Sealants: Latex, complying with ASTM C 834, Type P, Grade NF and with applicable requirements in Division 07 Section "Joint Sealants," recommended by sealant manufacturer and manufacturer of substrates for intended application.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prime lumber to be painted, including both faces and edges. Cut to required lengths and prime ends. Comply with requirements in Division 09 Section "Exterior Painting."

3.2 INSTALLATION, GENERAL

A. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut exterior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Install stairs with no more than 3/16-inch (4.7-mm) variation between adjacent treads and risers and with no more than 3/8-inch (9.5-mm) variation between largest and smallest treads and risers within each flight.

3.3 STANDING AND RUNNING TRIM INSTALLATION

A. Install flat grain lumber with bark side exposed to weather.

B. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches (610 mm) long except where necessary.

1. Use scarf joints for end-to-end joints.
2. Stagger end joints in adjacent and related members.

C. Fit exterior joints to exclude water. Cope at returns and miter at corners.

3.4 SIDING INSTALLATION

A. Install siding to comply with manufacturer's written instructions.

B. Hardboard Siding: Install hardboard siding complying with AHA's "Recommended Basic Application and Painting Instructions for Hardboard Siding." Install panels with edges over framing or blocking. Leave 3/16-inch (5-mm) gap at perimeter, openings, and horizontal panel joints unless otherwise recommended by panel manufacturer.

1. Seal butt joints at inside and outside corners and at trim locations.
2. Conceal fasteners to greatest practical extent by placing in grooves of siding pattern or by concealing with applied trim or battens as detailed.

END OF SECTION 062013

SECTION 064013 - EXTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior standing and running trim.
2. Exterior frames and jambs.
3. Exterior shutters.
4. Exterior ornamental work.
5. Shop priming exterior woodwork.
6. Shop finishing exterior woodwork.

1.2 SUBMITTALS

A. Product Data: For wood-preservative-treated materials and finishes indicated.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples: For lumber for exterior wood stain finish for each finish system and color, with one-half of exposed surface finished.

1.3 QUALITY ASSURANCE

A. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards."

1. Provide AWI Quality Certification Program labels and certificates for woodwork, including installation.

B. Forest Certification: Provide exterior architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. Fabricators: Subject to compliance with requirements, provide exterior architectural woodwork by one of the following:

2.2 MATERIALS

A. Preservative Treatment by Nonpressure Process: Comply with AWPA N1 using the following preservative for woodwork items indicated to receive water-repellent preservative treatment:

1. Water-Repellent Preservative: Formulation containing 3-iodo-2-propynyl butyl carbamate (IPBC) complying with AWPA P8 as its active ingredient.
2. Water-Repellent Preservative/Insecticide: Formulation containing 3-iodo-2-propynyl butyl carbamate (IPBC) as its active ingredient, combined with an insecticide containing chlorpyrifos as its active ingredient, both complying with AWPA P8.

B. Nails: Aluminum or hot-dip galvanized.

C. Screws: Aluminum, hot-dip galvanized or stainless steel.

2.3 FABRICATION

A. Wood Moisture Content: 7 to 12 percent.

B. Complete fabrication, including assembly, finishing, 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.

C. Woodwork for Transparent Finish:

1. Grade: Custom.
2. Wood Species: Western red cedar

D. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

E. Shop Priming: Shop prime woodwork for paint finish with one coat of wood primer specified in Division 09 painting Sections.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

F. Shop Finishing: Entire finish of exterior architectural woodwork is specified in this Section. To greatest extent possible, finish architectural woodwork at fabrication shop. Defer only final touchup and cleaning until after installation.

1. Grade: Same grade as item to be finished.
2. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.
3. AWI Finish System: Catalyzed polyurethane.

4. WI Finish System: 5, catalyzed polyurethane.
5. Sheen: Satin 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

B. Quality Standard: Install woodwork to comply with same grade specified in Part 2 for type of woodwork involved.

C. Install woodwork true and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

D. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk concealed fasteners and blind nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.

F. Install trim with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Scarf running joints and stagger in adjacent and related members.

G. Complete finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail and screw holes with matching filler where exposed.

H. Refer to Division 09 Sections for final finishing of installed architectural woodwork.

I. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064013

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interior standing and running trim.
2. Interior frames and jambs.
3. Wood cabinets.
4. Plastic-laminate cabinets.
5. Plastic-laminate countertops.
6. Solid-surfacing-material countertops.
7. Shop finishing of woodwork.

B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.

1.2 SUBMITTALS

A. Product Data: For solid-surfacing material, cabinet hardware and accessories, handrail brackets and finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:

1. Lumber and panel products for transparent finish, for each species and cut, finished on one side and one edge.
2. Lumber and panel products with shop-applied opaque finish, for each finish system and color, with exposed surface finished.
3. Plastic-laminates, for each type, color, pattern, and surface finish.
4. Thermoset decorative panels, for each type, color, pattern, and surface finish.
5. Solid-surfacing materials.

D. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of woodwork.

B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards."

1. Provide AWI Quality Certification Program labels and certificates for woodwork, including installation.

C. Forest Certification: Provide interior architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1.4 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by one of the following:

2.2 MATERIALS

A. Wood Species and Cut for Transparent Finish: White ash, plain sawn or sliced

B. Wood Products:
1. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.

C. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

E. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

1. 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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABA Industries.
b. Avonite, Inc.

c. E. I. du Pont de Nemours and Company.
d. Formica Corporation.
e. LG Chemical, Ltd.
f. Meganite Inc.; a division of the Pyrochem Group.
g. Nevamar Company, LLC; Decorative Products Div.
h. Samsung; Cheil Industries Inc.
i. Swan Corporation (The).
j. Transolid, Inc.
k. Wilsonart International; Div. of Premark International, Inc.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Use Exterior Type or Interior Type A. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Kiln-dry material after treatment.

B. Fire-Retardant Particleboard: Panels made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture with flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing.

C. Wire Pulls: Back mounted, solid metal, 4 inches (100 mm) long

D. Drawer Slides: BHMA A156.9, B05091.

1. Standard Duty Grade 1: Side mounted and extending under bottom edge of drawer; full-extension type; with polymer rollers.
2. Box Drawer Slides: Grade 1; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
3. File Drawer Slides: Grade 1HD-100; for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.

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

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

G. 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.

2.5 MISCELLANEOUS MATERIALS

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

B. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

2.6 FABRICATION

A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

1. Interior Woodwork Grade: Custom.
2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.
3. Install glass to comply with applicable requirements in Division 08 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

B. Interior Standing and Running Trim:

1. For transparent-finished trim items wider than available lumber, use veneered construction. Do not glue for width.
2. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
3. Assemble casings in plant except where limitations of access to place of installation require field assembly.

C. Plastic-Laminate Cabinets:

1. AWI Type of Cabinet Construction: Flush.
2. Reveal Dimension: [1/2 inch (13 mm).
3. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate as follows:

    a. Horizontal Surfaces Other Than Tops: Grade HGS.
    b. Postformed Surfaces: Grade HGP.
    c. Vertical Surfaces: Grade HGS.

    d. Edges: Grade

4. Materials for Semiexposed Surfaces Other Than Drawer Bodies: High-pressure decorative laminate
5. Drawer Sides and Backs: Thermoset decorative panels.
6. Drawer Bottoms: Thermoset decorative panels.
7. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of colors.

8. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

D. Plastic-Laminate Countertops:

1. High-Pressure Decorative Laminate Grade: HGS
2. Colors, Patterns, and Finishes: As indicated by manufacturer's designations.
3. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of colors finish.
4. Edge Treatment: Same as laminate cladding on horizontal surfaces.
5. Core Material at Sinks: Particleboard made with exterior glue.

2.7 SHOP FINISHING

A. Finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

B. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

B. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

C. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm). Shim as required with concealed shims.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Scarf running joints and stagger in adjacent and related members. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.

1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, blocking, or hanging strips or toggle bolts through metal backing or metal framing behind wall finish.

H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

END OF SECTION 064023

SECTION 07131 - SELF-ADHERING SHEET WATERPROOFING

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. Rubberized-asphalt sheet waterproofing

B. Related Sections include the following:

1. Division 3 for cast-in-place concrete.

1.3 PERFORMANCE REQUIREMENTS

A. Provide waterproofing that prevents the passage of water.

1.4 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

B. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

C. Sample Warranty: Copy of special waterproofing manufacturer's and Installer's warranty stating obligations, remedies, limitations, and exclusions before starting waterproofing.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is authorized, approved, or licensed by waterproofing manufacturer to install manufacturer's products.

B. Source Limitations: Obtain waterproofing materials molded- sheet drainage panels through one source from a single manufacturer.

C. Mock-ups: Apply waterproofing to 100 square feet of wall to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality.

1. If Architect determines mockups do not comply with requirements, reapply

waterproofing until mockups are approved.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

E. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform tests and inspections of the work and to prepare test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

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

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

D. Store rolls according to manufacturer's written instructions.

E. 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.

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

1.8 WARRANTY

A. Special Manufacturer's Warranty: Written warranty, signed by waterproofing manufacturer agreeing to replace waterproofing material that does not comply with requirements or that does not remain watertight during specified warranty period.

1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and

crocks in substrate exceeding 1/16 inch in width.
2. Warranty Period: Three years after dote of Substantial Completion.

B. Special Installer's Warranty: Written waterproofing Installer's warranty, signed by Installer, covering work of this section, for warranty period of two years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the following products:

1. Rubberized-Asphalt Sheet Waterproofing:

a. American Hydrotech, Inc.; VM 75.
b. American Permaquik Inc.; PQ 7100.
c. Carlisle Corporation, Carlisle Coatings & Waterproofing Div.; CCW 701.
d. W. R. Grace & Co.; Bituthene.
e. W. R. Meadows, Inc.; Mel-Rol.
f.. T. C. MiraDri; MiraDri.
g. Polyguard Products, Inc.; Polyguard 650.

2.2 RUBBERIZED-ASPHALT SHEET WATERPROOFING

A. Rubberized-Asphalt Sheet: 60-mil- thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4-mil- thick, polyethylene film with release liner on adhesive side.

1. Physical Properties: As follows, measured per standard test methods referenced:

a. Tensile Strength: 250 psi minimum; ASTM D 412, Die C, modified

b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C , modified.

c. Low-Temperature Flexibility: Pass at minus 20 degrees F; ASTM D 1970.

d. Crack Cycling: Unaffected after 100 cycles of 1/8- inch movement; ASTM C 836.

e. Puncture Resistance: 40 pounds minimum; ASTM E 5385

f. Hydrostatic- Head Resistance: 150 feet minimum; ASTM D 5385.

g. water absorption: 0.15 percent weight-gain maximum after 48- hour

immersion at 70 degrees F; ASTM D 570.

h. Vapor Permeance: 0.05 perms; ASTM E 96, water method.

B. Products: Subject to compliance with requirements, provide the following at elevator pit slab:

1. Preprufe 300, W.R. Grace & Co.

2.3 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B.Primer: liquid solvent-borne primer recommended for substrate by manufacturer of sheet Waterproofing material.

C. Surface Conditioner: liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.

D. Sheet Strips: Self- adhering, rubberized-asphalt composite sheet strips of same material and thickness as sheet waterproofing.

. E. liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.

F. Substrate Patching Membrane: low-viscosity, two-component, asphalt-modified coating.

G. Mastic, Adhesives, and Tape: liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

H. Metal Termination Bars: Aluminum bars, approximately 1 inch by 1/8-inch thick, pre-drilled at 9-inch centers.

I. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578 Type X, ½ inch thick.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.

1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by
plastic sheet method according to ASTM D 4263.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrates according to manufacturers written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

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

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

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.

1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.

F. Bridge and cover isolation joints expansion joints and discontinuous deck-to-wall and deck to-deck joints with overlapping sheet strips.

1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.

1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:

a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.

H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 RUBBERIZED-ASPHALT SHEET APPLICATION

A. Install self-adhering sheets according to waterproofing manufacturers written instructions and recommendations in ASTM D 6135.

B. Apply primer to substrates at required rate and allow to dry. limit priming to areas that will be covered by sheet waterproofing in same day. Re-prime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

1. When ambient and substrate temperatures range between 25 and 40 degrees F, install self-adhering, rubberized-asphalt sheets produced for low temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 degrees F.

D. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.

E. Seal exposed edges of sheets at terminations not concealed by metal counter flashings or ending in reglets with mastic or sealant.

F. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing. Provide continuous waterproof membrane at intersection of horizontal and vertical membranes

G. Repair tears, voids,' and lapped seams in waterproofing not complying with requirements. Slit and flatten fish mouths and blisters. Patch with sheets extending 6 inches beyond repaired areas in all directions.

H. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

3.4 PROTECTION AND CLEANING

A. Protection Board: Install protection board over completed membrane, complying with Manufacturer’s recommendations for both waterproofing sheet and protection course materials.

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

C. Protect installed insulation drainage panels from damage due to ultraviolet light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

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

END OF SECTION 071310

SECTION 072100 BUILDING 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 concealed building insulation.

B. Related Sections include the following:
Division 3 Section "Cast-in-Place Concrete."
Division 9 Sections "Gypsum Board Assemblies" for installation in wood-framed assemblies of insulation specified by reference to this Section.

1.3 DEFINITIONS

A. Thermal Resistivity (R-value) is the reciprocal of thermal conductivity (k-value) which is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivity (R-value) is expressed by the temperature difference in degrees F between two parallel surfaces required to cause 1 BTU to flow through 1 square foot of a homogenous material exactly 1 inch thick per hour at the mean temperature indicated.

B. LTTR: Long Term Thermal Resistance. Determine LTTR values using techniques from CAN/ULC S 770, based on ASTM C 1303.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.

C. Research/Evaluation Reports: For foam-plastic insulation.

1.5 QUALITY ASSURANCE

A. Source limitations: Obtain each type of building insulation through one source.

B. Fire-Test-Response Characteristics: Provide insulation and related materials 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. Identify materials with appropriate markings of applicoble testing and inspecting agency.

C. Surface-Burning Characteristics: ASTM E 84.

D. Fire-Resistance Ratings: ASTM E 119.

E. Combustion Characteristics: ASTM E 136.

1.6 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:

C. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

D. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.

E. 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 products that may be incorporated into the Work include, but are not limited to, the following:

1. Extruded-Polystyrene Board Insulation:
2. DiversiFoam Products.
3. Dow Chemical Company.
4. Owens Corning.
5. Tenneco Building Products.
8. Johns Manville Corporation.
9. Knauf Fiber Glass.
10. Owens Corning.
11. Slag-Wool-/Rock-Wool-Fiber Insulation:
12. Fibrex Insulations Inc.
13. Owens Corning.
14. Thermafiber.

2.2 INSULATING MATERIALS General: Provide insulating materials that comply with requirements and with referenced standards.

A. Preformed Units: Sizes to fit applications indicated; selected from manufacturers standard thicknesses, widths, and lengths.

B. Insulation within sound-attenuating walls and floor / ceiling construction shall be manufactured and labeled for the intended application.

C. Insulation within fire-resistive walls shall be labeled and listed with the appropriate agency, such as Ul, for the fire-resistive application referenced.

D. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:

E.. Type X, 1.30 pounds per cubic foot for interior side of perimeter masonry walls. Minimum lTIR - 10.0.

a. Basis of Design: Styrofoam Z-Mate, by Dow Chemical Company.

F. Un-faced Mineral-Fiber Blanket Insulation: For use at the exterior stud walls.

1. ASTM C 665, Type I (blankets without membrane coverings), consisting of fibers manufactured from glass, slag wool, or rock wool.
2. Width of blankets shall be as necessary for friction-fitting between studs.

H. Unfaced Mineral-Fiber Blanket Insulation: "Thermafiber" mineral fiber SAFB,

1. ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from manufactured from slag or rock wool, with maximum f1amespread and smoke-developed indices of 25 and 50,

respectively; passing ASTM E 136 for combustion characteristics. Minimum density 2.5 pounds per cubic foot.

2. Sound-attenuating partitions - 3 inches minimum thickness.

I. Polyurethane Foam: two-component system made by combining an isocyanate (A) component with a polyol (B) component, with the following physical characteristics:

1. Density: nominal 0.5 pounds per cubic foot
2. Tensile Strength: 5.6 pounds per square inch.
3. Thermal Performance, R-value per inch: 3.8
4. Surface Burning Characteristics: ASTM E84 Tunnel Test
5. Flame Spread - 21
6. Smoke Developed - 216
7. Polyurethane Foam Primers: Primers used shall be as recommended by the manufacturer of the spray foam materials specified.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

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

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of puncturing insulation blanket or of interfering 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, and unsoiled and that has not been left 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. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. 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 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. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

C. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
D. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
E. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically, and support faced blankets by taping the stapling flanges to the flanges of the metal studs.
F. Stuff glass-fiber, loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 pounds per cubic foot.
G. Before installing attic insulation, inspect the attic space to verify that tops of all plumbing and party walls have been closed and that all spaces, holes and gaps that might permit insulation to fall into walls and allow air infiltration have been covered or plugged. Batts with matching R-value to be installed at all attic edges to provide baffle for blown in insulation. Make sure that batt insulation is in place at eave conditions prior to installing loose fill material.
H. Install rigid insulation between Z-shaped metal furring strips spaced at 24 inches on center where indicated over CMU walls. Insulation board shall be fit snug to the web of the furring strips, with not more than 1 /16-inch gap between the edge of the insulation board and the furring strip.
I. Do not apply sealant to the gap between the insulation board and the furring strips.

3.5 SPRAY FOAM INSULATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
B. Mask adjacent surfaces.
C. Apply urethane foam as recommended by the foam manufacturer.
D. Install thickness to achieve R-value indicated.
E. Clean off residue affected by overspray.

3.6 PROTECTION

A. Do not permit insulation to contact recessed incandescent lights, unless fixtures are UL-rated for contact with insulation, or prefabricated fireplace assemblies, maintain proper clearance required by manufacturer.
B. Protect installed insulation 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.
C. Replace any insulating material that becomes wet during the construction phase.

END OF SECTION

SECTION 072150 - SPRAY-ON POLYURETHANE FOAM 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 self-supported, spray-applied polyurethane foam insulation.

1 .3 REFERENCES

A. Standard Building Code

1. Section 103.7 Alternate Materials and Methods
2. Section 2603 Foam Plastic Insulation

B. Buildings Officials & Code Administrators International, Section 2603.0 Foam Plastic

C. ASTM E84 Surface Burning Characteristics

D. SBCCI Evaluation # 9758

E. Warnock Hersey Evaluation # 193 - 7081

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Mockup: Before beginning installing the Work, build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location indicated or, if not indicated, as directed by Architect or Construction Manager.
2. Size of mock-up shall be not less than 100 square feet.
3. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's and Construction Manager's approval of mockups before starting work, fabrication, or construction.
   a. Allow seven days for initial review and each re-review of each mockup.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work. -
7. Approved mockups may become part of the completed Work if

undisturbed at time of Substantial Completion.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.

D. Research/Evaluation Reports: For foam-plastic insulation.

1 .5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide insulation and related materials 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. Identify materials with appropriate markings of applicable testing and inspecting agency.

C. Contractor performing work under this section must be trained by Demilec (USA) llC in the art of applying SEAlECTION ™500

1.6 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. Materials shall be delivered in manufacturers original sealed containers clearly labeled with manufacturer's name, product identification, safety, information, net weight of contents and expiration date.

C. Material is to be stored in a manner recommended by the manufacturer, and where the temperatures are in the limits specified by the material manufacturer.

D. Protect plastic insulation as

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. 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 ore not limited to, products specified.

2.2 SPRAY-APPLIED POLYURETHANE FOAM INSULATION

A. Spray Applied Semi Rigid Polyurethane Foam Insulation system

B. Product: SEALECTION ™500 Manufactured by Demilec (USA) LLC, Grand Prairie, Texas.

C. Properties:

METHOD	DESCRIPTION	VALUE
ASTM D 1622	Density	0.45 - 0.5 pounds per bic foot
ASTM C 518	Thermal Resistance 2 days @ 760 F Thermal Resistance 90 days @ 760 F	3.81 degrees F x h x /BTU at 75 deg F 3.81 degrees F x h x /BTU at 75 degrees F
ASTM E 283 -	Air leakage @ 75 Po (25 miles/hr. wind) Sustained Wind Load for 60 minutes @ 1000 miles per hour wind) Gust Wind load Test @ 3000 Po (160	0.00013 cubicfeet per square foot No damage No damage
ASTM D 1621	Compressive Strength	0.7 psi
ASTM D 1623	Tensile Strength	2.5 psi
ASTM E 413-87 ASTM C 423	Sound Transmission Class (STC) Noise Reduction Coefficient (NRC)	39 75
ASTM E 96	Water Vapor Permeance	*318 ng/Pa* s.m2
CGSB 51.23-92	Off Gassing Tests (VOC Emissions)	Pass (No toxic vapors)

ASTM E84	Surface Burning Characteristics (6 inches) • Flame Spread Index • Smoke Development	 21 - Class 1 216

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 for other conditions affecting performance.

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

B. Verify that surfaces and conditions are suitable to accept work as outlined in this section.

C. Report in writing, any defects in surfaces or conditions which may adversely affect the performance of products installed under this section to the consultant prior to commencement of work.

D. Commencement of work outlined in this section shall be deemed as acceptance of existing work and conditions.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

B. Perform adhesion test on mock-up sample. Proceed only after confirmation that manufacturer's recommended adhesion is obtained.

3.3 INSTALLATION

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

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

C. Extend insulation in thickness indicated to envelop entire area to be insulated.

D. Apply self-supported, spray-applied polyurethane insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked.

3.4 PROTECTION

A. Protect installed insulation 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 07215

SECTION 072600 UNDER-SLAB VAPOR BARRIER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Construction Agreement and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Products Supplied Under This Section include Vapor Barrier, seam tope, pipe boots, detail strip for installation under concrete slobs on grade.

1 .3 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM E 1745-97 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
2. ASTM E 154-88 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
3. ASTM E 96-95 Standard Test Methods for Water Vapor Transmission of Materials
4. ASTM E 1643-98 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

B. American Concrete Institute (ACI): ACI 302.1 R-96 Vapor: Barrier Component (plastic membrane) not less than 10 mils thick

1 .4 SUBMITTALS

A. Independent laboratory test results showing compliance with ASTM & ACI Standards.

B. Manufacturer's samples, product literature for sheet, seam tape, and accessories.

C. Manufacturer's installation instructions for placement, seaming, and pipe penetration boot installation.

PART 2 - PRODUCTS

2 .1 MATERIAL

A. Vapor Barrier: membrane shall have the following qualities:

1. Maximum Permeance per ASTM E-154 Section 7: 0.03 Perms
2. Water Vapor Barrier ASTME-17 45: Meets or exceeds Class A
3. Thickness of Barrier (plastic) ACI 302.1 R-96.

B. Products: Subject to compliance with requirements, provide one of the products specified:

1. Stego Wrap 15 mil Vapor Barrier by Stego Industries LLC.
2. Vapor Block 15 by Raven Industries
3. Griffolyn T -105 by Reef Industries
4. Moistop Ultra "A" by Fortifiber

2.2 ACCESSORIES

A. Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 4 inches.
B. Pipe Boots: Construct pipe boots from vapor barrier material and pressure sensitive tope per manufacturer's instructions.

PART 3 - EXECUTION

3.1 PREPARATION
A. Level and tamp or roll aggregate, sand or tamped earth base. Ensure that subsoil is approved by geotechnical engineer.

3.2 INSTALLATION
A. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
1. Unroll Vapor Barrier with the longest dimension parallel with the direction of the pour.
2. Lap Vapor Barrier over footings and seal to foundation walls.
3. Overlap side and end joints between sheets 6 inches and seal with pressure sensitive tape.
4. Seal all penetrations (including pipes) with pipe boot mode from Vapor Barrier and tape.
5. No penetration of the vapor barrier is allowed except for reinforcing steel and Permanent utilities.
6. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all four sides with pressure sensitive tape.

END OF SECTION 072600

SECTION 072650 WEATHER BARRIERS

PART 1 -GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Construction Agreement and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Air infiltration I Moisture Barrier
   2. Self-adhering flexible flashing to connect and seal materials at openings and penetrations in exterior wall construction.

B. Related Sections include the following:
   1. Section – Gypsum Sheathing.
   2. Section - Rough Carpentry.
   3. Section - Flashing and Sheet Metal
   4. Section - Joint Sealants
   5. Section Aluminum-Storefront

1.3 SUBMITTALS

A. Product Data: Manufacturer's specifications and technical data for each type weather barrier material installed, including installation and substrate preparation instruction and applicable Material Safety Data Sheets.

B. Samples: Submit 6-inch square samples of self-adhering flexible flashing.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver in original, unopened packaging with seals intact and bearing legible labels identifying manufacturer, product name and grade, and contents. Include installation and substrate preparation instructions.

B. Store in dry, ventilated spaces.

C. Follow manufacturer's storage and handling instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Air 1nfiltration / Moisture Barrier: Non-woven, air and secondary weather barrier.
   1. Spun-bonded olefin, non-woven, non-perforated
   2. Air Penetration, .004 CFM per square foot at 75 Pa pressure; ASTM E-1677 Type 1 air barrier.
   3. Water vapor transmission, not less than 50 perm, per ASTM E96, Method B.
   4. Water penetration resistance of not less than 200 cm of hydrostatic head In accordance with AATCC-127.
   5. Tear resistance (trapezoid), 7/9 pounds, per ASTM D-1117

B. DuPont IFlexWrap"

C. DuPont "StraightFlash"

D. Perm-A-Barrier Membrane; W.R. Grace
E. Miradri TWF; Mirafi
F. Polyguard
G. Vycor 40; Grace Construction Products
H. Miscellaneous Materials: Provide fasteners, primers, adhesive compounds, and other materials recommended by weather barrier materials manufacturers for securement to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine installation areas. Do not proceed until unsatisfactory conditions have been corrected.

Starting work constitutes acceptance of conditions as satisfactory for installation of weather barrier by Contractor.

3.2 INSTALLATION

A. Coordination: Coordinate installation of weather barrier with installation of flashing and other components of exterior wall construction to ensure drainage of entrapped water to exterior.
B. Install weather barrier in accordance with manufacturer's published installation guidelines and recommendations. Prepare window and door openings in strict accordance with the manufacturer's recommended methods and materials.
C. Weather Barrier: Cover wall sheathing with membrane horizontally with a 6 inch overlap and a 6 inch end lop. Fasten to sheathing with corrosion-resistant nails with plastic washers. Coordinate with related self-adhering membrane sheeting as indicated in drawings and in manufacturer's literature.
D. First course of weather barrier shall extend below the sill plate. Seal bottom edge of the weather barrier to the foundation substrate continuously with polyurethane sealant.
E. Use lap seam sealant tope provided by the manufacturer of the weather barrier at each horizontal lap seam.
F. Cut out window and door openings in strict accordance with the manufacturer's installation guidelines. Wrap material back into the openings and seal with tope.
G. Self Adhering Flexible Flashing: Install at perimeters of windows, doors, louvers, vents, sheathing control joints, building expansion joints, floor levels, flashing, penetrations of exterior wall surfaces and as indicated in drawing prior to installation of exterior surfacing materials. Coordinate with weather barrier to provide continuous barrier as indicated on drawings.
    1 . Apply manufacturer's recommended primer on wood and masonry substrates in accordance with instructions, and allow to dry as recommended prior to installation of flexible flashing.
H. Cut flashing in lengths required for application of flashing at bottom, sides, and top of windows, doors, louvers, control and expansion joints, and other locations as indicated. Remove release liner and apply membrane starting from lowest point and work upward in a shingle manner. Secure flashing firmly in place with staples and self-adhering adhesive backing.

I. Seal seams, laps, protrusions, and accidental cuts with manufacturer's recommended mastic.
J. At sills of openings, provide end dams extending 4 inches up sides of openings.
K. Fold minimum 4 inches onto vertical plane of wall over building weather barrier.
L. Repair: Repair torn or damaged weather barrier materials prior to installation of exterior wall surfacing materials,' overlapping materials in shingle manner to ensure drainage of entrapped water to exterior.

END OF SECTION

SECTION 074113 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam metal roof panels.
2. Concealed-fastener, lap-seam metal roof panels.
3. Standing-seam metal roof panels.
4. Batten-seam metal roof panels.
5. Metal soffit panels.

B. Related Sections:

1. Division 07 Section "Sheet Metal Roofing" for custom-fabricated and on-site, roll-formed sheet metal roofing.

1.2 PERFORMANCE REQUIREMENTS

A. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

B. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance.

C. FMG Listing: Provide metal roof panels and component materials that comply with requirements in FMG 4471 as part of a panel roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

D. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:

E. Energy Performance: Provide roof panels that are listed on the U.S. Department of Energy's ENERGY STAR Roof Products Qualified Product List for steep-slope roof products.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages,

trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

C. Samples: For each type of exposed finish required.

D. Delegated-Design Submittal: For metal roof panel assembly indicated to comply with performance requirements and design criteria, including analysis data and calculations signed and sealed by the qualified professional engineer responsible for their preparation.

E. Coordination Drawings: Roof plans, drawn to scale, based on input from installers of the items involved.

F. Maintenance data.

G. Warranties: Samples of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.
2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.

3. Surface: Smooth, flat finish.
4. Exposed Coil-Coated Finish:

    a. 2-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
    b. 3-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
    c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

5. Concealed Finish: Manufacturer's standard white or light-colored acrylic or polyester backer finish.

B. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; as recommended in writing by metal roof panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.2 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

2. 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:

    a. AEP-Span.
    b. Architectural Building Components.
    c. Architectural Metal Systems.
    d. Architectural Roofing and Siding, Inc.
    e. ATAS International, Inc.
    f. Berridge Manufacturing Company.
    g. Butler Manufacturing; a BlueScope Steel company.
    h. CENTRIA Architectural Systems.
    i. Copper Sales, Inc.
    j. Dimensional Metals, Inc.
    k. Englert, Inc.
    l. Fabral.
    m. Flexospan Steel Buildings, Inc.
    n. Galvamet; Galvacer Building Systems.
    o. IMETCO.
    p. Integris Metals.
    q. MBCI; a division of NCI Building Systems, L. P.
    r. McElroy Metal, Inc.
    s. Merchant & Evans.
    t. Metal-Fab Manufacturing, LLC.
    u. Metal Sales Manufacturing Corporation.
    v. Metecno-Morin; Division of Metecno Inc.
    w. Modern Metal Systems, Inc.
    x. Petersen Aluminum Corporation.
    y. Steelox Systems, L.L.C.
    z. Ultra Seam Incorporated.
    aa. United Steel Deck Inc.; Subsidiary of Bouras Industries Inc.
    bb. VICWEST; Div. of Jenisys Engineered Products.

3. Profile: Vertical-rib, snap-joint, as indicated on Drawings.
4. Material: Zinc-coated (galvanized) steel sheet.

    a. Exterior Finish: 3-coat fluoropolymer.
    b. Color: As selected by Architect from manufacturer's standard colors.

5. Clips: Floating to accommodate thermal movement.

    a. Material: Metallic coated steel.

6. Joint Type: As standard with manufacturer.

2.4 ACCESSORIES

A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings,

fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.018 inch (0.45 mm) thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

C. Gutters: Formed from same material roof panels. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2400-mm-) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches (900 mm) o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match [metal roof panels] [roof fascia and rake trim].

D. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- (3-m-) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual". Finish downspouts to match gutters.

2.5 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Substrate Board: Install substrate boards over roof deck on entire roof surface. Attach with substrate-board fasteners.

1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

B. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

3.2 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated on Drawings, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

B. Felt Underlayment: Apply at locations indicated on Drawings, in shingle fashion to shed water, and with lapped joints of not less than 2 inches (50 mm).

C. Apply slip sheet over underlayment before installing metal roof panels.

D. Install flashings to cover underlayment to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."

E. Repair tears or punctures immediately before concealment by other work.

3.3 METAL ROOF PANEL INSTALLATION

A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.

3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3.4 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
3. Provide elbows at base of downspouts to direct water away from building.

3.5 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074113

SECTION 074600 - SIDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fiber-cement siding.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1. For vinyl siding, include VSI's official certification logo printed on product data.

B. Samples: For siding including related accessories.

C. Qualification Data: For qualified vinyl siding Installer.

D. Product certificates.

E. Product test reports.

F. Research/evaluation reports.

G. Maintenance data.

H. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

B. Vinyl Siding Installer Qualifications: A qualified installer who employs a VSI-Certified Installer on Project.

C. Vinyl Siding Certification Program: Provide vinyl siding products that are listed in VSI's list of certified products.

D. Source Limitations: Obtain each type, color, texture, and pattern of siding, including related accessories, from single source from single manufacturer.

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

1.4 WARRANTY

A. Special Warranty: Standard form in which manufacturer agrees to repair or replace siding that fail(s) in materials or workmanship within specified warranty period.

1. Warranty Period: 25 years from date of Substantial Completion.

1.5 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish full lengths of siding including related accessories, in a quantity equal to 2 percent of amount installed.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

1. 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:

2. Basis-of-Design Product: Subject to compliance with requirements, provide James Hardie or equivalent.

3. Horizontal Pattern: Boards 5-1/4 inches (133 mm) plain style.

a. Texture: Rough sawn.

4. Vertical Pattern: 48-inch- (1200-mm-) wide board and batten sheets with wood-grain texture and manufacturers fiber board nailed per manufacturers reccomendations. 1X2 battens @ 16 inches (300 mm) o.c. and at sheet joints adhered with manufacturers adhesive as recommended to conceal all mechanical fasteners. Note: Do not nail any battens.

5. All hardi-siding to have integral color.

2.2 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories made from same material as adjacent siding unless otherwise indicated.

B. Flashing: Provide aluminum flashing complying with Division 07 Section "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

1. Finish for Aluminum Flashing: High-performance organic finish, same color as siding.

C. Fasteners:

1. For fastening to wood, use siding nails of sufficient length to penetrate a minimum of 1 inch (25 mm) into substrate.
2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch (6 mm), or three screw-threads, into substrate.
3. For fastening aluminum, use aluminum fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.
4. For fastening fiber cement, use hot-dip galvanized fasteners.
5. For fastening vinyl, use hot-dip galvanized fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and related accessories.

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

3.2 INSTALLATION

A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Do not install damaged components.
2. Center nails in elongated nailing slots without binding siding to allow for thermal movement.

B. Install fiber-cement siding and related accessories.

1. Install fasteners no more than 24 inches (600 mm) o.c.

C. Install joint sealants as specified in Division 07 Section "Joint Sealants" and to produce weather tight installation.

D. Where aluminum siding will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.

3.3 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074600

DIVISION 075000 UNDERLAYMENTS

Part 1 General

1.01 Summary

A. Section Includes: Grace Ice & Water Shield" self-adhering membrane as a sloped roof underlayment.

B. Related Sections:

1. Section: Rough Carpentry
2. Section: Building Insulation
3. Section: Metal Roofing
4. Section: Sheet Metal Flashing and Trim

1.02 References

A. American Society for Testing and Materials (ASTM)

1. D412 Standard Test Methods for Vulcanized Rubber and Elastomeric Tension
2. D461 Standard Test Methods for Felt
3. D903 Test Methods for Peel or Stripping Strength of Adhesive Bonds
4. D1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet a. Materials Used as Steep Roofing Underlayment for Ice Dam Protection
5. D3767 Standard Practice for Rubber Measurement of Dimensions
6. E96 Standard Test Methods for Water Vapor Transmission of Materials

1.03 Submittals

A. Manufacturer's product data sheet and product sample.

1.04 Quality Assurance

A. Manufacturer Qualifications: Self-adhesive membrane roofing underlayment shall be manufactured and marketed by W. R. Grace & Co.-Conn., Grace Construction Products, Cambridge, MA or a firm with a minimum of 25 years experience in the production and sales of self-adhered membrane roofing underlayments.

1.06 Delivery, Storage and Handling

A. The membrane and accessory products must be handled properly. Read all product labels and Material Safety Data Sheets (MSDSs) for proper handling and disposal. Deliver all materials in manufacturer's unopened packages and store all materials under cover. Do not double stack palletized material.

Part 2 Products

2.02 Manufacturers and Products

A. Acceptable Products and Manufacturers:

1. Grace Ice & Water Shield manufactured by W. R. Grace & Co.-Conn., Grace Construction Products, Cambridge, MA.

2.03 Materials

A. Grace Ice & Water Shield is a cold-applied, self-adhering membrane composed of a high density, cross laminated polyethylene film coated on one side with a layer of rubberized asphalt adhesive. An embossed, slip resistant surface is

provided on the polyethylene. Grace Tee & Water Shield is interwound with a disposable silicone coated release sheet. Membrane shall conform to the physical properties as listed in the chart below:

Property	Value	Test Method
Color	Gray-black	
Thickness, membrane	40 mil (1.02 mm)	ASTM 03767 procedure A (Section
Tensile strength, membrane	250 psi (1720 kN/m2)	ASTM 0412 (Die C
Elongation, membrane	250%	ASTM 0412 (Die C
Low temperature flexibility	Unaffected @ -20°F (-29°C)	ASTM 01970
Adhesion to plywood	3.0 lbs/in. width (525 N/m)	ASTM 0903
Permeance (max)	0.05 Perms (2.9 ng/m2s Pal	ASTM E96
Material weight installed	0.3 lblft2 (1.3 kg 1m2)	ASTM 0461

2.04 Accessories

A. Accessory Products: Perm-A-BalTier" WB Primer.

B. Prime wood composition and gypsum sheathing with Perm-A-BalTier WB Primer if adhesion is found to be marginal. (Refer to Technical Letter 12, Use on Oriented Strand Board (OSB) Roof Sheathing.) Apply at same rate.

C. Priming is not required for other suitable surfaces provided that they are clean and dry.

Part 3 Execution

3.02 Preparation

A. Install the membrane directly on a clean, dry, continuous structural deck. Some suitable deck materials include plywood, wood composition, wood plank, metal, concrete, or gypsum sheathing. Remove dust, dirt, loose nails, and old roofing materials. Protrusions from the deck area must be removed. Decks shall have no voids, damaged, or unsupported areas. Repair deck areas before installing the membrane.

Prime concrete, masonry surfaces and DensDeck® with Perm-A-Barrier WB Primer at a rate of250-350 ft2/gal (6-8 m2/L).

3.03 Installation

A. Install in strict accordance with manufacturer's printed application procedures, precautions, and limitations.

END OF SECTION 075000

SECTION 076000 FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Construction Agreement and Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes the following sheet metal fabrications, flashing and counterflashing, and trim:
   1. Metal flashing, drip caps, fascia roof edge, and drip edge strips at porch waterproofing.
   2. Gutters and downspouts.
   3. Counter-flashing and reglets.
   4. Soffit Vents

B. Related Sections include the following:
   1. Division 6 Sections "Rough Carpentry" and "Finish Carpentry" for wood trim, wood nailers, and blocking.
   2. Section "Metal Roof Panels".
   3. Section SBS-Modified Bituminous Sheet Roofing
   4. Section - Manufactured Roof Specialties for parapet wall coping.
   5. Section - Joint/Sealers.

1.3 PERFORMANCE REQUIREMENTS

A. All sheet metal work shall be in conformance with details and recommendations of the Sheet Metal and Air Conditioning Contractor's National Association (SMACNA), Architectural Sheet Metal Manual (latest edition).

B. 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.

C. 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:

D. Wind Zone 2: For velocity pressures of 31 to 45 pounds-force per square foot: 90 pounds-force per square foot perimeter uplift force, 120 pounds-force per square foot corner uplift force, and 45 pounds-force per square foot outward force.

E. 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 night time-sky heat loss.

F. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel Sheet: ASTM a 240, Type 302 or 304, finished as follows:

B. Match finish of adjacent metal roofing.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: 30 to 40 mils thick minimum, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

2.4 FLASHING AND SHEET METAL

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 cops or factory-applied coating.

C. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.

D. Blind Fasteners: High-strength stainless-steel rivets.

E. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tope with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape.

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

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

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 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. 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.

C. Seams for Stainless Steel: Provide watertight, continuously welded seams..

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

E. 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.

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

G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal.

H. Thickness: As indicated in the Drawings, but not less than as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, and not less than thickness of metal being secured.

2.6 SHEET METAL FABRICATIONS

A. Stainless Steel: Fabricate from 0.018- inch material, unless indicated otherwise.

2.7 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Gutters: Manufactured formed gutter in uniform section lengths not exceeding 12 feet, with mitered and welded or soldered corner units, end caps, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front gutter rim. Furnish with expansion joints and expansion-joint covers fabricated from same metal as gutters. Fabrication shall be in accordance with SMACNA recommendations.

1. Fabricate from stainless steel, per SMACNA but not less than .018" thick.

C. Expansion Joints: lop type.

D. Accessories: Valley baffles.

E. Downspouts: 6" diameter with mitered elbows, manufactured from stainless steel, not less than .018" thick.

F. Furnish matching wall brackets with stainless steel anchors.

1. Conform to SMACNA Figure 1-35D.
2. Hangers shall be spaced not less than 5'-0" aport.
3. Anchor to veneer with 1/8-inch diameter stainless steel fasteners.

2.8 COUNTER-FLASHING

A. Manufactured units in lengths not exceeding 12 feet designed to snap into reglets and compress against base flashing with joints lopped, from Stainless Steel: 0.0250 inch thick.

B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counter-flashing pieces, and compatible with flashing indicated, from the following exposed metal in thickness indicated: Stainless Steel: 0.0250 inch thick

1. Type: For stucco application, with upturned fastening flange and extension leg of length to match thickness of applied finish materials.

C. Accessories: Counter-flashing wind-restraint clips.

2.9 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 pointed 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 some 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.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Field measure site conditions prior to fabricating work.

B. Secure flashing in place using non-corrosive fasteners.
Fit flashing tight in place. Make corners square, surfaces true and straight, in planes and lines accurate to profiles.

3.3 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.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by pointing contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

C. 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.

D. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.

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

F. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.

G. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

H. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

I. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

J. 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.

K. Provide membrane flashing at penetrations such as electrical switches, wall penetrations, etc. Extend flashing 4 inches beyond opening, lop joints in direction of water flow, seal to substrate.

L. At sheathed walls, seal flashing to sheathing and lap weather barrier over flashing a minimum of 6 inches.

M. Pipe or Post Counter-flashing: Install counter-flashing 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 bond and tighten.

N. Counter-flashing: Coordinate installation of counter-flashing with installation of base flashing.

O. Insert counter-flashing in reglets or receivers and fit tightly to base flashing. Extend counter-flashing 4 inches over base flashing. Lap counter-flashing joints a minimum of 4 inches and bed with elastomeric sealant.

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

3.5 CLEANING AND PROTECTION

A. First paragraph below is not applicable to stainless steel and painted or coated steel and aluminum.

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

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

D. 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.

E. 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

SECTION 077110 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Roof-edge drainage systems.
   2. Rain Barrel

1.2 PERFORMANCE REQUIREMENTS

A. FM Approvals' Listing: Manufacture and install roof-edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-120. Identify materials with FM Approvals' markings.

B. SPRI Wind Design Standard: Manufacture and install roof-edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:

   1. Design Pressure: As indicated on Drawings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.

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

D. Product test reports.

E. Maintenance data.

F. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1.5 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ROOF-EDGE DRAINAGE SYSTEMS

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:

B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:

1. Andreas Renner KG.
2. Architectural Products Company.
3. ATAS International, Inc.
4. Berger Building Products, Inc.
5. Castle Metal Products.
6. Cheney Flashing Company.
7. CopperCraft by FABRAL; a Euramax company.
8. Hickman Company, W. P.
9. Klauer Manufacturing Company.
10. Merchant & Evans, Inc.
11. Metal-Era, Inc.
12. Metal-Fab Manufacturing, LLC.
13. MM Systems Corporation.
14. National Sheet Metal Systems, Inc.

C. Gutters: Manufactured in uniform section lengths not exceeding 12 feet (3.6 m) with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch (25 mm) above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.

1. Fabricate from the following exposed metal:
   a. Stainless Steel: 0.016 inch (0.40 mm) thick .

2. Gutter Profile: Half circle as indicated according to SMACNA's "Architectural Sheet Metal Manual."
3. Corners: Factory mitered and continuously welded and sealed watertight.
4. Gutter Supports: Straps Manufacturer's standard supports as selected by Architect with finish matching the gutters.
5. Special Fabrications: Radiussed sections.

6. Gutter Accessories: Continuous hinged leaf guard of solid metal designed to shed leaves.

D. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout, exterior flange trim, and built-in overflow.

1. Fabricate from the following exposed metal:
   a. Stainless Steel: 0.016 inch (0.40 mm) thick.

E. Stainless-Steel Finish: No. 4 (bright, polished directional satin).

F. Rain Barrel: 50-Gallon Wood Grain Resin RTS Flat Back Rain Barrel or equivalent.

1. Sit barrel on 30”x30” concrete pad see plans for locations.
2. Provide Good Directions or equivalent 6’-0” copper rain chain attached to gutter above barrel opening.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet (3.6 m) with no joints within 18 inches (450 mm) of corners or intersections unless otherwise shown on Drawings.

2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws

E. Seal joints with sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm) except reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.2 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions.

B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches (610 mm) apart. Attach ends with rivets and solder to make watertight. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet (15.2 m) apart. Install expansion joint caps.
2. Install continuous leaf guards on gutters with noncorrosive fasteners, hinged to swing open for cleaning gutters.

C. Downspouts: Provide stainless steel chain to 12” within rain barrel. Provide Stainless steel 12” diameter funnel w/ 4” outlet into rain barrel.

D. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch (25 mm) below gutter discharge.

3.3 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 roof specialties are installed.

END OF SECTION 077100

SECTION 07920 JOINT SEALANTS

PART 1 - GENERAL

1 .1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Extent of each form and type of joint sealer is indicated on drawings and schedules.

B. This Section includes joint sealants for but not limited to the following locations:

1. Exterior and interior joints in vertical surfaces and non-traffic horizontal surfaces as indicated below.
   a. Control and expansion joints in unit masonry.
   b. Cement plaster stucco expansion joints.
   c. Joints between different materials.
   d. Perimeter joints between wall materials and frames of doors and windows.
   e. Control and expansion joints in ceiling and overhead surfaces.
   f. Under thresholds.
   g. Pre-formed expansion joint seal
   h. Other joints as indicated.

2. Exterior joints in horizontal traffic surfaces as indicated below:
   a. Control, expansion, and isolation joints in cast-in-place concrete slabs for sidewalks and paving. Where sidewalks abut the building.

C. Sealing joints related to flashing and sheet metal for roofing is specified in Division-7 Section: "Sheet Metal Flashings and Trim."

D. Sealants for glazing purposes are specified in Division-S Section "glazing."

E. Sealing concealed perimeter joints of gypsum drywall partitions to reduce sound transmission characteristics is specified in Division-9 Section "Gypsum Drywall."

F. Sealants submitted for joints in and adjacent to brick veneer and aluminum and glass framing systems shall be non-staining and non-bleeding type. Sealants must be tested on samples prior to submitting to verify that the sealant will not stain the brick veneer or aluminum framing and gloss.

1.3 SYSTEM PERFORMANCES

A. Provide elastomeric joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

1.4 SUBMITI ALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application.

C. Samples for Initial Selection Purposes: Manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view.

D. Samples for verification purposes of each type and color of joint sealer required.
Install joint sealer samples in 1/2 inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealers. Provide minimum of three custom color samples as noted above for Architect/Owner review.

E. Certificates from manufacturers of joint sealers attesting that their products comply with specification requirements and are suitable for the use indicated.

F. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturers interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

G. Product test reports for each type of joint sealers indicated, evidencing compliance with requirements specified.

H. Pre-construction field test reports indicating which products and joint preparation methods demonstrated acceptable adhesion to joint substrates.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an Installer who has successfully completed within the last 3 years at least 3 joint sealer applications similar in type and size to that of this Project.

B. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.

C. Pre-construction Compatibility and Adhesion Testing: Submit samples of all . materials that will contact or affect joint sealers to joint sealer manufacturers for compatibility and adhesion testing, as indicated below:

1 . Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealers to joint substrates.
2. Perform tests under normal environmental conditions that will exist during actual installation.

D. Product Testing: Provide comprehensive test data for each type of joint sealer based on tests conducted by a qualified independent testing laboratory on current product formulations within a 24-month period preceding date of Contractor's submittal of test results to Architect.

1 . Test elastomeric sealants for compliance with requirements specified by reference to ASTM C 920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C 719), lowtemperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.

E. Pre-construction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:

1. locate test joints where indicated or, if not indicated, as directed by Architect.
2. Conduct field tests for each application indicated below:
   a. Each type of elastomeric sealant and joint substrate indicated.
3. Notify Architect one week in advance of the dates and times when mock-ups will be erected.
4. Arrange for tests to take place with Architect present.
5. Test Method: Test joint sealers by hand pull method described below:
   a. Install joint sealants in 5-feet joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealants to cure fully before testing.
   b. Make knife cuts as follows: A horizontal cut from one side of joint to the other followed by 2 vertical cuts approximately 2 inches long at side of joint and meeting horizontal cut at top of 2 inch cuts. Place a mark 1 inch from top of 2 inch piece.

c. Use fingers to grasp 2 inch piece of sealant just above 1 inch mark; pull firmly down at a 90 degree angle or more while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 1 0 seconds.

6. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates ortore cohesively. Include data on pull distance used to test each type of product and joint substrate.
7. Evaluation of Field 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 which fail to adhere to joint substrates during testing.

F. Field-Constructed Mock-Ups: Prior to installation of joint sealers, applyelastomeric sealants to the following selected building joints as indicated below for further verification of colors selected from sample submittals and to represent completed work for qualities of appearance, materials, and application:

1. Joints in field-constructed mock-ups of assemblies specified in other sections which are indicated to receive elastomeric joint sealants specified in this section.
2. Retain mock-ups during construction as standard for judging completed construction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product nome and designation, color, expiration period for use, pot life, curing time, and mixing instructions for nlulti-component materials.

B. Store and handle materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers.

2. When joint substrates are wet due to rain, frost, condensation, or other causes.

B. Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.8 SEQUENCING AND SCHEDULING

A. Sequence installation of joint sealers to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealers, joint fillers 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.

B. Colors: Provide color of exposed joint sealers indicated or, if not otherwise indicated, as selected by Architect from manufacturer's available colors. For all exterior applications, the sealant color shall match the color of the adjacent and adjoining materials. Product substitutions must offer at least the same number and quality of available colors as the products listed.

2.2 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturers standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those referenced for Type, Grade, Closs, and Uses.

B. One-Part Nonacid-Curing Silicone Sealant: Type S, Grode NS, Class 25, and complying with the following requirements for Uses and additional joint movement capability:

1. Uses NT, M, G, A, and, as applicable to joint substrates indicated, O.

   a. Additional capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the following percentage changes in joint width as measured at time of application and remain in compliance with other requirements of ASTM C 920 for Uses indicated:
   b. 50 percent movement in both extension and compression for a total of 100 percent movement.

C. One-Part Mildew-Resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide; intended for sealing interior joints with nonporous substrates and subject to in-service exposure to conditions of high humidity and temperature extremes.

D. Multi-Part Pourable Urethane Sealant for Use T: Type M, Grade P, Class 25, and complying with the following requirements for Uses:

1. Uses T, M, A, and, as applicable to joint substrates indicated, o.

E. Available Products: Subject to compliance with requirements and compatibility with the substrates, elastomeric sealants which may be incorporated in the Work include, but are not limited to, the following:

1. One-Port Nonacid-Curing Silicone Sealant for joints in the stucco veneer, and at perimeter of aluminum and steel frames, and in ioints of other exterior materials compatible with the sealant manufacturer's recommendations:
   a. "Dow Corning 790"; Dow Corning Corp.
   b. "Pecora 890", Pecora Corporation.

2. One-Port Mildew-Resistant Silicone Sealant, for toilet and bathroom room tile and around toilet fixtures:
   a. "Dow Corning 786[11]; Dow Corning Corp.
   b. "SCS 1 702 Sanitary"; General Electric Co.
   c. "898 #345 White"; Pecora Corp.

3. Multi-Port, Pourable, Urethane Sealant for Use T, for parking areas, sidewalks:
   a. "Vulkem 245"; Mameco International, Inc.
   b. "NR-200 Urexpan"; Pecora Corp.
   c. "THC-900"; Tremco Inc.

4. Joints in cementitious siding and panels:

   a. VIP FC33 Performance Joint Sealant

2.3 LATEX JOINT SEALANTS

A. Acrylic-Emulsion Sealant: Manufacturer's standard, one part, non-sag, mildew-resistant, acrylic-emulsion sealant complying with ASTM C 834, formulated to be paintable and recommended for exposed applications on interior locations involving joint movement of not more than plus or minus 5 percent, at interior door and window frames.

B. Available Products: Subject to compliance with requirements, latex joint sealants which may be incorporated in the Work include, but are not limited to, the following:

1. Acrylic-Emulsion Sealant:
   a. "AC-20"; Pecora Corp.
   b. "Tremflex 834"; Tremco Inc.

2.4 PREFORMED JOINT SEALANTS

A. Preformed Foam Sealant: Manufacturer's standard preformed, pre-compressed, open-cell foam sealant that is manufactured from high-density urethane foam impregnated with a nondrying, water-repellent agent; is factory produced in precompressed sizes in roll or stick form to fit joint widths indicated; is coated on one side with a pressure-sensitive adhesive and covered with protective wrapping; develops a watertight and airtight seal when compressed to the degree specified by manufacturer; and complies with the follo~ing:

1. Available Products: EMSEAL Joint Systems, ltd.; Emseal 20H.
2. Properties: Permanently elastic, mildew resistant, non-migratory, non-staining, and compatible with joint substrates and other joint sealants.
   a. Density, uncompressed: 10 pounds per cubic foot.

2.5 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-staining, non-waxing, non-extruding strips of flexible, plastic foam of material indicated below; nonabsorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Open-cell or closed-cell polyethylene foam, as recommended by the sealant manufacturer.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Provide type recommended by joint sealer manufacturer required where adhesion of sealant to joint substrates indicated, as determined for from construction joint sealer-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

C. Masking Tape: Provide non-staining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

2.7 JOINT FILLERS FOR CONCRETE PAVING

A. General: Provide joint fillers of thickness and widths indicated.

B. Bituminous Fiber Joint Filler: Preformed strips of composition below, complying with ASTM D 1751:

1. Asphalt saturated fiberboard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint

sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer); old joint sealers; oil; grease; waterproofing; water repellents; water; surface dirt; and frost.
2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form release agents from concrete.
4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile; and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on pre-construction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants.

D. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
   a. Do not leave gaps between ends of joint fillers.
   b. Do not stretch, twist, puncture, or tear joint fillers.
   c. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.

2. Install bond breaker tope between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.
3. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

E. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability. Install sealants at the some time sealant backings are installed.

F. Install sealant in joints at the edges of cementitious siding panels, and the ends of lopped cementitious siding. Seal joints between siding and trim.

1. Where batten strips are placed over joints between cementitious panels, seal joints before applying the batten strip.

G. Tooling of Non-sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.
2. Provide flush joint configuration per Figure 6B in ASTM C 962, where indicated.
   a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated ioint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

END OF SECTION 07900

SECTION 081113 - HOLLOW METAL 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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.

B. Related Sections:
1. Division 08 Section "Flush Wood Doors" for wood doors in hollow metal frames.
2. Division 08 Section "Finish Hardware" for door hardware for hollow metal doors and frames.
3. Division 09 Sections "Painting" for field painting hollow metal doors and frames.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.

5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of electrical knockout boxes and preparations for power, signal, and control systems.

C. Samples for Verification:

1. Samples are only required by request of the architect and for manufactures that are not current members of Steel Door Institute.

2. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 125 mm).
3. For the following items, prepared on Samples about 12 by 12 inches (305 by 305 mm) to demonstrate compliance with requirements for quality of materials and construction:

   a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
   b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow metal panels and glazing if applicable.

D. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

E. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40" above sill) or UL 10C.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature

end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

C. Fire-Rated, Borrowed-Light Frame 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 257. Label each individual glazed lite.

D. Smoke-Control Door Assemblies: Comply with NFPA 105.

E. Preinstallation Conference: Conduct conference at Project site for hollow metal frames requiring electrical knockout boxes to verify installation of conduit on frames.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (102-mm-) high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with this section requirements, provide products by one of the following:
   1. Ceco Door Products; an Assa Abloy Group company.
   2. Curries Company; an Assa Abloy Group company..
   3. Deansteel Manufacturing
   4. Steelcraft; an Ingersoll-Rand company.

2.2 MATERIALS

A. Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A 366 (ASTM A 366M), commercial quality, or ASTM A 620 (ASTM A 620M), drawing quality, special killed.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

C. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.

   1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

E. Glazing: Comply with requirements in Division 08 Section "Glazing."

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide 1 3/4" thick doors of design indicated, fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

   1. Design: Flush panel
   2. Core Construction: Manufacturer's standard polystyrene or polyurethane.

      a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
      b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-rated assemblies with R Factor 11 or better.

         1) Locations: Exterior doors.

   3. Vertical Edges for Single-Acting Doors: Beveled edge

a. Beveled Edge: 1/8 inch in 2 inches (3 mm in 50 mm).

4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch (54-mm) radius.
5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick, end closures or channels of same material as face sheets.
6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheets. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), minimum 16 ga thick steel, Model 2 (Seamless face and edges).

C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), minimum 16 gage thick steel, Model 2 (Seamless face and edges).

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheets.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as face welded joints and back weld joints continuously, unless otherwise indicated.
3. Frames for Level 3 Steel Doors: minimum 14 ga thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as face welded unless otherwise indicated.
3. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions.
4. Frames for Level 3 Steel Doors: minimum 14 ga thick steel sheet.

5. Frames 48-inches and wider in opening width are required to be minimum 14 ga steel sheet.
6. Frames for Wood Doors: minimum 16 ga thick steel sheet.
7. Frames for Borrowed Lights: minimum 16 ga thick steel sheet.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (50 mm) wide by 10 inches (250 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 HOLLOW METAL PANELS

A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.7 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as frames in which they are installed.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inches (0.4 mm) thick.

2.9 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8

C. Hollow Metal Doors:

1. Exterior Doors:

a. Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Top of door to be flush and completely sealed joints in top edges of doors against water penetration.
b. Provide Polyurethane core.

2. Glazed Lites: Factory cut openings in doors with applied flush trim to fit.
3. Astragals: Provide overlapping astragal as noted in door hardware sets in Division 8 Door Hardware on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted.
4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 8 Door Hardware.
5. Electrical Raceways: Provide raceways for electrified door hardware specified in hardware sets in Division 8 Door Hardware.
6. Seamless Edge: Provide seamless edge on hollow metal doors by intermittently tack welding seam, grinding smooth and finishing edge free from defects and blemishes.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Continuously backweld joints at exterior frames.
2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.

3. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inch and wider with mortise/butt type hinges at top hinge location.
4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 8 Door Hardware.
5. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
6. Grout Guards: Weld guards boxes to frame at back of hardware mortises in frames at all hinge and strike preps regardless of grouting requirements.
7. Provide 6 inch hospital stops with 45 degree slope to soffit to flush out with rabbet at base of frame at interior openings, except for double egress frames.

    a. Provide welded base anchors for frames with hospital stops.
8. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; included but not limited to electric thru wire hinges, electrical raceways, door position switches, electric strikes, jamb mount card readers, and magnetic locks as noted in door hardware sets in Division 8 Door Hardware.

    a. Electrical knock out boxes are required at door position switches, electric strikes, card readers, and middle hinge locations for all exterior locations regardless of electrical hardware specified in Division 8 Door Hardware.
    b. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
    c. Conduit to be coordinated and installed in field from middle hinge box and strike box to door position box.
    d. Conduit to be factory installed for electric hardware preps. Frames with factory installed conduit to have weld in place anchors.
    e. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 8 Door Hardware.
    f. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.
    g. Provide prewired and standardized plug connects for door hardware specified in Division 8 Door Hardware.

9. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
10. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

        1) Two anchors per jamb up to 60 inches (1524 mm) high.
        2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
        3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.

4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.

b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

1) Three anchors per jamb up to 60 inches (1524 mm) high.
2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
5) Two anchors per head for frames above 42 inches (1066 mm) wide and mounted in metal-stud partitions.

11. Door Silencers: Except on weather-stripped or gasketed doors, drill stops to receive door silencers as follows. Keep holes clear during construction. Silencers to be supplied by frame manufacture regardless if specified in division 8 Door Hardware.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricators shop

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that glazed lites are capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
5. Gap for butted or mitered joints in glass stop should not exceed .0625-inch.

2.10 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

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.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable glazing stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post installed expansion anchors.

    a. Floor anchors may be set with powder-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. Field Supplied Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
7. Grouting Requirements:

    a. Do not grout head of frames unless reinforcing has been installed in head of frame.
    b. Do not grout vertical or horizontal closed mullion members.

8. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
    b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.

    a. Secure exterior removable stops with security head screws.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

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. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections:
1. Division 08 Section "Glazing" for glass view panels in flush wood doors.

1.3 SUBMITTALS

A. Product Data: For each type of door indicated. Include details of core and edge construction 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-protection ratings for fire-rated doors.

C. Samples for Initial Selection: For factory-finished doors.

D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish.

a. Provide samples for each species of veneer and solid lumber required.
b. Finish veneer-faced door samples with same materials proposed for factory-finished doors.

2. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

E. Warranty: Sample of special warranty.

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 from single manufacturer.

C. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."

1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
2. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
3. Provide WI-Certified Compliance Certificate for installation.

D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test 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 or cardboard cartons.

C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather-tight, wet work in spaces is complete and dry, and HVAC system is

operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather-tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
   b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Exterior Doors: Two years from date of Substantial Completion.
4. Warranty Period for Solid-Core Interior Doors: Life of installation.
5. Warranty Period for Hollow-Core Interior Doors: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 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. Algoma Hardwoods, Inc.
2. Eggers Industries.
3. Graham; an ASSA Abloy Group company.
4. Marshfield Door Systems, Inc.
5. VT Industries 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. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.
2. Extra Heavy Duty: Classrooms, public toilets, janitor's closets, assembly spaces, and exits.

C. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, Grade LD-2.
2. Particleboard: Straw-based particleboard complying with ANSI A208.1, Grade LD-2 or M-2, except for density.
3. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

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.

D. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

a. Screw Withdrawal, Face: 700 lb.
b. Screw Withdrawal, Edge: 400 lb.

E. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Comply with specified requirements for exposed edges.
3. Pairs: Provide formed-steel edges and astragals.

a. Finish steel edges and astragals with baked enamel, same color as doors.
b. Finish steel edges and astragals to match door hardware (locksets or exit devices).

F. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.

2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.

   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 laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Exterior Solid-Core Doors:

1. Grade: Economy (Grade B faces).
2. Species: Select white maple.
3. Cut: Plain sliced (flat sliced).
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Balance match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Exposed Vertical and Top Edges: Same species as faces or a compatible species.
8. Core: Particleboard.
9. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.
10. Adhesives: Type I per WDMA TM-6.
11. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

B. Interior Solid-Core Doors:

1. Grade: Economy (Grade B faces).
2. Species: Select white maple.
3. Cut: Plain sliced (flat sliced).
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Balance match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 10 feet or more.
8. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
9. Blueprint Match: Where indicated, provide doors with faces produced from same flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling.

10. Exposed Vertical and Top Edges: Applied wood-veneer edges of same species as faces and covering edges of faces.
11. Core: Particleboard.
12. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press. Retain one of first two options in subparagraph above or retain first subparagraph below. Third option above applies to some five-ply doors. Glued-wood-stave core is only available with bonded construction and nonglued-wood-stave core is only available with nonbonded construction.
13. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.4 LOUVERS AND LIGHT FRAMES

A. Wood Louvers: Door manufacturer's standard solid-wood louvers unless otherwise indicated.

1. Wood Species: Species compatible with door faces.

2.5 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.

1. Wood Species: Species compatible with door faces.
2. Profile: Lipped tapered beads.
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

C. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated.

2.6 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.

1. Fabricate door and transom panels with full-width, solid-lumber meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

D. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."
3. Louvers: Factory install louvers in prepared openings.

E. Exterior Doors: Factory treat exterior doors with water repellent after fabrication has been completed but before factory finishing.

1. Flash top of out swinging doors (with manufacturer's standard metal flashing).

2.7 SHOP PRIMING

A. Doors for Transparent Finish: Shop prime doors with stain (if required), other required pretreatments, and first coat of finish as specified in Division 09 Section "Exterior Painting Staining and Transparent Finishing." Seal all four edges, edges of cutouts, and mortises with first coat of finish.

2.8 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Transparent Finish:

1. Grade: Custom.
2. Finish: AWI TR-7 Clear Polyester system.
3. Sheen: Semi gloss.

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 08 Section "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the 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 edges of doors, edges of cutouts, and mortises 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 unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

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-Fitted Doors: Align in frames for uniform clearance at each edge.

E. 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 that 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 081416

SECTION 081433 - STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior stile and rail wood doors.
   2. Priming stile and rail wood doors.
   3. Fitting stile and rail wood doors to frames and machining for hardware.
   4. Pre-hanging doors in frames.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and other pertinent data.

C. Samples: Representing typical range of color and grain for each species of veneer and solid lumber required. Finish Sample with same materials proposed for factory-finished doors.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. 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."

C. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use only materials that comply with referenced standards and other requirements specified. Assemble exterior doors and side lites with wet-use adhesives.

B. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea-formaldehyde resins.

2.2 EXTERIOR STILE AND RAIL WOOD DOORS

A. Exterior Stile and Rail Wood Doors Type SRD: Exterior doors complying with WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors."

1. 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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Belentry Doors LLC.
    b. International Door and Latch.
    c. Jeld-Wen, Inc.
    d. Karona, Inc.
    e. McPhillips Manufacturing Company.
    f. QSM Doors, Inc.
    g. Simpson Door Company.

3. Finish and Grade: Transparent and Premium or Select.
4. Wood Species: Idaho white, lodge pole, ponderosa, or sugar pine.
5. Glass: Uncoated, clear insulating-glass units made from two lites of 3.0-mm-thick, fully tempered glass with 1/4-inch (6.4-mm) inter space complying with Division 08 Section "Glazing."

2.3 INTERIOR STILE AND RAIL WOOD DOORS

A. Interior Stile and Rail Wood Doors Type SRD: Interior doors complying with WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors."

1. 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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Belentry Doors LLC.
    b. International Door and Latch.
    c. Jeld-Wen, Inc.
    d. Karona, Inc.
    e. McPhillips Manufacturing Company.
    f. QSM Doors, Inc.
    g. Simpson Door Company.

3. Finish and Grade: Transparent and Premium or Select.
4. Wood Species: Idaho white, lodgepole, ponderosa, or sugar pine.

5. Glass: Uncoated, clear, laminated glass made from two lites of 3.0-mm-thick annealed glass complying with Division 08 Section "Glazing."

2.4 STILE AND RAIL WOOD DOOR FABRICATION

A. Fabricate stile and rail wood doors in sizes indicated for field fitting.

B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:

1. Clearances: Provide 1/8 inch (3 mm) at heads, jambs, and between pairs of doors. Provide 1/2 inch (13 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch (10 mm) 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 (3-1/2 degrees) at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) on lock edge; trim stiles and rails only to extent permitted by labeling agency.

C. Factory machine doors for hardware that is not surface applied.

D. Glazed Openings: Trim openings indicated for glazing with solid wood moldings, with one side removable. Miter wood moldings at corner joints.

E. Glazed Openings: Glaze doors at factory with glass of type and thickness indicated, complying with Division 08 Section "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C 920. Secure glass in place with removable wood moldings. Miter wood moldings at corner joints.

F. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish, and quality of construction.

G. Exterior Doors: Factory treat exterior doors after fabrication with water-repellent preservative to comply with WDMA I.S.4. Flash top of out-swinging doors with manufacturer's standard metal flashing.

H. Pre-hung Doors: Provide stile and rail doors as pre-hung units including doors, frames, weather stripping, and hardware.

1. Provide wood door frames that comply with Division 06 Section "Interior Finish Carpentry."
2. Provide hardware, including weather stripping and thresholds, that complies with Division 08 Section "Door Hardware."

2.5 SHOP PRIMING

A. Doors for Transparent Finish: Shop prime doors with stain (if required), other required pretreatments, and first coat of finish as specified in Division 09 Section "Staining and Transparent Finishing." Seal all four edges, edges of cutouts, and mortises with first coat of finish.

2.6 FINISHING

A. Finish wood doors at factory that are indicated to receive transparent finish. For doors indicated to be factory finished, comply with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.

B. Transparent Finish:

1. Grade: Premium.
2. Finish: AWI catalyzed polyurethane system.
3. Staining: As selected by Architect from manufacturer's full range.
4. Effect: Open-grain finish.
5. Sheen: Satin.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."

B. Install wood doors to comply with manufacturer's written instructions, WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," and other requirements specified.

C. Field-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 with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1. Clearances: Provide 1/8 inch (3 mm) at heads, jambs, and between pairs of doors. Provide 1/4 inch (6 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch (6 mm) from bottom of door to top of threshold.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

END OF SECTION 081433

SECTION 08411 - ALUMINUM ENTRANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents: Conditions of the Contract, Division 1 - General Requirements, and Drawings apply to Work of this Section.

B. Section Includes:
1. Aluminum doors complete with hardware.

D. Related Sections:
1. Submittal requirements
2. Metal Fabrications
3. Rough Carpentry.
4. Joint Sealants.
5. Door Hardware.
6. Glazing.

1.2 REFERENCES

A. Aluminum Association (AA):
1. DAF-45 Designation System for Aluminum Finishes.

B. American Architectural Manufacturers Association (AAMA):
1. 501.2 Field Check of Metal Curtain Walls for Water Leakage.
2. 2605 Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
3. 606.1 Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.
4. 607.1 Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
5. 608.1 Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
6. 701.2 Specifications for Pile Weather-stripping.
7. Manual #10 Care and Handling of Architectural Aluminum From Shop to Site.
8. SFM-1 Aluminum Storefront and Entrance Manual.

C. American National Standards Institute (ANSI):
1. A117.1 Safety Standards for the Handicapped.

D. American Society for Testing and Materials (ASTM):
1. A36 Structural Steel.
2. A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. B209 Aluminum and Aluminum - Alloy Sheet and Plate.
4. B221 Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
5. B308 Aluminum-Alloy 6061-T6 Standard Structural Shapes, Rolled or Extruded.
6. E283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
7. E330 Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure

Difference.

8. E331 Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

E. Federal Specifications (FS):
1. TT-P-641G(1) Primer Coating, Zinc Dust-Zinc Oxide (For Galvanized Surfaces).
2. TT-P-645A Primer, Paint, Zinc Chromate, Alkyd Type.

F. Steel Structures Painting Council (SSPC):
1. Paint 12 Cold-Applied Asphalt Mastic (Extra Thick Film).

1.3 SYSTEM REQUIREMENTS

A. Design Requirements:
1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
2. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
3. Provide concealed fastening.
4. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
5. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
6. Anchors, fasteners and braces shall be structurally stressed not more than 50% of allowable stress when maximum loads are applied.
7. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.

1.4 SUBMITTALS

A. General: Submit in accordance with Section 01300.

B. Product Data:
1. Submit manufacturer's descriptive literature and product specifications.
2. Include information for factory finishes, hardware, accessories, and other required components.
3. Include color charts for finish indicating manufacturer's standard colors available for selection.

C. Shop Drawings:
1. Submit shop drawings covering fabrication, installation and finish of specified systems.
2. Include following:
   a. Fully dimensioned plans and elevations with detail coordination keys.
   b. Locations of exposed fasteners and joints.
3. Provide detailed drawings of:
   a. Composite members.
   b. Joint connections for framing systems and for entrance doors.
   c. Glazing methods and accessories.
4. Schedule of finishes.

D. Samples:

1. Submit manufacturers standard samples indicating quality of finish.
2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility:

1. To ensure quality of appearance and performance, obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer.

B. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.

C. Perform Work in accordance with AAMA SFM-1 and manufacturer's written instructions.

D. Conform to requirements of ANSI A117.1 and local amendments.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 01600.

B. Protect finished surfaces as necessary to prevent damage.

C. Do not use adhesive papers or sprayed coatings which become firmly bonded when exposed to sun.

D. Do not leave coating residue on any surfaces.

E. Replace damaged units.

1.7 WARRANTY

A. Provide warranties in accordance with Section 01700.

B. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from deflective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within 1 year from date of Substantial Completion.

C. Warranty shall cover following:

1. Complete watertight and airtight system installation within specified tolerances.
2. System is structurally sound and free from distortion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Subject to compliance with requirements indicated, provide products by one of the following:
1. Vistawall Architectural Products

B. Substitutions: Submit under provisions of Section 01630, a minimum of 10 days prior to bid date.

C. Acceptable Entrance Systems:

Model 212 -narrow stile (4-1/2" bottom rail, 2-3/4" top rail, 1-5/8" verticals)

2.2 FRAMING MATERIALS AND ACCESSORIES

A. Aluminum:
   1. ASTM B221, alloy 6063-T5 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.

B. Internal Reinforcing:
   1. ASTM A36 for carbon steel.
   2. Shapes and sizes to suit installation.
   3. Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645.

C. Anchorage Devices:
   1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.
   2. Hot-dip galvanize steel assemblies after fabrication, comply with ASTM A123, 2.0 ounce minimum coating.

D. Fasteners:
   1. Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.
   2. Provide concealed fasteners wherever possible.
   3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
   4. For concealed locations, provide manufacturer's standard fasteners.

E. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.

F. Protective Coatings: Cold-applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.

G. Touch-Up Primer for Galvanized Components: Zinc oxide conforming with FS TT-P-641.

H. Glazing Gaskets:
   1. Compression type design, replaceable, molded or extruded, of neoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM).
   2. Profile and hardness as required to maintain uniform pressure for watertight seal.

I. Weather-stripping:
   1. Wool pile conforming to AAMA 701.2.
   2. Provide EPDM or vinyl-blade gasket weather-stripping in bottom door rail, adjustable for contact with threshold.

2.3 GLAZING

A. Refer to Section 088100.

2.4 DOOR HARDWARE

A. Refer to Section 087100.

2.5 FABRICATION

A. Coordination of Fabrication:
   1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
   2. Fabricate units to withstand loads which will be applied when system is in place.

B. General
   1. Conceal fasteners wherever possible.
   2. Reinforce work as necessary for performance requirements, and for support to structure.
   3. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators which will prevent contact and corrosion.
   4. Comply with Section 08810 for glazing requirements.

D. Entrance Doors:
   1. Fabricate with mechanical joints using internal [steel] reinforcing plates and shear blocks attached with fasteners and by welding.
   2. Provide extruded aluminum glazing stops of rounded and mitered design, permanently anchored on security side and removable on opposite side.

E. Hardware:
   1. Receive hardware supplied in accordance with Section 08710 and install in accordance with requirements of this Section.
   2. Cut, reinforce, drill and tap frames and doors as required to receive hardware.
   3. Comply with hardware manufacturer's templates and instructions.
   4. Use concealed fasteners wherever possible.

F. Welding:
   1. Comply with recommendations of the American Welding Society.
   2. Use recommended electrodes and methods to avoid distortion and discoloration.
   3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.

G. Flashings: Form from sheet aluminum with same finish as extruded sections. Material thickness as required to suit condition without deflection or "oilcanning".

2.6 FINISHES

A. Color Anodized:
   1. Conforming to AA-M12C22A44 and AAMA 606.1 and 608.1.
   2. Architectural Class [I] [II], etched, medium matte, dark bronze colored anodic coating, 0.7 mil minimum thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 014000.

3.2 INSTALLATION

A. Erection Tolerances:

1. Limit variations from plumb and level:
   a. 1/8 inch in 10'-0" vertically.
   b. 1/8 inch in 20'-0" horizontally.
2. Limit variations from theoretical locations: 1/4 inch for any member at any location.
3. Limit offsets in theoretical end-to-end and edge-to-edge alignment: 1/16 inch from flush surfaces not more than 2 inches apart or out-of-flush by more than 1/4 inch.

B. Install doors and hardware in accordance with manufacturer's printed instructions.
C. Set units plumb, level and true to line, without warp or rack of frame.
D. Anchor securely in place, allowing for required movement, including expansion and contraction.
E. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.
F. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weathertight construction.
G. Coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction in accordance with requirements of Section 07920.
H. Glazing: Refer to requirements of Section 08810.

3.3 ADJUSTING

A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.4 CLEANING

A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.
B. Clean metal surfaces exercising care to avoid damage.

END OF SECTION

SECTION 085113 – VINYL WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes fixed and operable aluminum-framed windows.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide vinyl windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size required by AAMA/WDMA 101/I.S.2/NAFS.

B. Structural Performance: Provide vinyl windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:

1. 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, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.

a. Basic Wind Speed: 90 mph (40 m/s).
b. Exposure Category: C.

2. Deflection: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch (19 mm), whichever is less, at design pressure based on testing performed according to AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Deflection Test or structural computations.

C. Windborne-Debris Resistance: Provide glazed windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 and requirements of authorities having jurisdiction.

D. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 180 deg F (100 deg C) material surfaces.

1.3 SUBMITTALS

A. Product Data: For each type of vinyl window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and installation details

C. Samples: For each exposed finish.

D. Product Schedule: Use same designations indicated on Drawings.

E. Field quality-control test reports.

F. Product test reports.

G. Maintenance data.

1.4 QUALITY ASSURANCE

A. Installer: A qualified installer, approved by manufacturer to install manufacturer's products.

B. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

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

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

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace vinyl windows that fails in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
c. Faulty operation of movable sash and hardware.

d. Deterioration of metals, other materials, and metal finishes beyond normal weathering.
e. Failure of insulating glass.

2. Warranty Period:

a. Window: Three years from date of Substantial Completion.
b. Glazing: 10 years from date of Substantial Completion.
c. Metal Finish: 15 years from date of Substantial Completion.

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:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated (Alenco 1111S or Jeld Wen) or a comparable product by one of the following:

1. Gerkin Windows and Doors.
2. Graham Architectural Products Corp.
3. Kawneer; an Alcoa Company.
4. Peerless Products Inc.
5. Thermal Windows, Inc.
6. TRACO.

2.2 WINDOW A,B,C,D,E.

A. Window Type: As indicated in a schedule.

B. Comply with AAMA/WDMA 101/I.S.2/NAFS.

1. Performance Class and Grade: R20.
2. Performance Class and Grade: LC30.
3. Performance Class and Grade: C35.
4. Performance Class and Grade: HC45.
5. Performance Class and Grade: AW 45.
6. Performance Class and Grade: As indicated.

C. Condensation-Resistance Factor (CRF): Provide vinyl windows tested for thermal performance according to AAMA 1503, showing a CRF of 45.

D. Thermal Transmittance: Provide vinyl windows with a whole-window, U-factor maximum indicated at 15-mph (24-km/h) exterior wind velocity and winter condition temperatures when tested according to ASTM E 1423.

1. U-Factor: 0.40 Btu/sq. ft. x h x deg F (2.3 W/sq. m x K or less).

E. Solar Heat-Gain Coefficient (SHGC): Provide vinyl windows with a whole-window SHGC maximum of 0.50, determined according to NFRC 200 procedures.

2.3 GLAZING

A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

B. Glass:Clear, insulating-glass units, argon gas filled, with low-E coating pyrolytic on second surface or sputtered on second or third surface, complying with Division 08 Section "Glazing."

C. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal and complies with requirements for windborne-debris resistance.

2.4 INSECT SCREENS

A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully integrate with window frame. Locate screens on outside of window and provide for each operable exterior sash or ventilator.

1. Aluminum Tubular Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," Residential R-20 class.

B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.

1. Aluminum Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet with minimum wall thickness as required for class indicated.
2. Finish: Match aluminum window members.
3. Finish: Baked-on organic coating in color selected by Architect from manufacturer's full range.
4. Finish: Manufacturer's standard.

C. Aluminum Wire Fabric: 18-by-16 (1.1-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-) diameter, coated aluminum wire.

1. Wire-Fabric Finish: Charcoal gray.

D. Wickets: Provide sliding wickets, framed and trimmed for a tight fit and for durability during handling.

2.5 FABRICATION

A. Fabricate vinyl windows that are re-glazable without dismantling sash or ventilator framing.

B. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.

C. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

D. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.

E. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

F. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch- (1.6-mm-) thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units. Provide subframes capable of withstanding design loads of window units.

G. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

2.6 VINYL FINISHES

A. Vinyl Finish:

1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

F. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

G. Clean vinyl surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

H. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

I. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502, Test Method A, by applying same test pressures required to determine compliance with AAMA/WDMA 101/I.S.2/NAFS in Part 1 "Performance Requirements" Article.
2. Testing Extent: Three mockup windows as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested immediately after installation.
3. Test Reports: Shall be prepared according to AAMA 502.

C. Remove and replace non-complying vinyl window and retest as specified above.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 085113

SECTION 08710 – FINISH HARDWARE

PART 1 – GENERAL:

1.1 SUMMARY:

A. Section includes Finish Hardware

B. Related Sections
Finish Carpentry – Division 6
Hollow Metal Doors and Frames – Division 8
Aluminum Storefront – Division 8

1.2 REFERENCES:

A. Documents and Institutes that shall be used in estimating, detailing and installing the items specified.
1. International Building Code – Current Edition
2. ICC/ANSI A117.1 – Accessible and Usable Building and Facilities – Current Edition
3. NFPA80 –Standards For Fire Doors and Fire Windows – Current Edition
4. NFPA101 – Life Safety Code – Current Edition
5. NFPA105 – Installation of Smoke-Control Door Assemblies – Current Edition.
6. UL Labeled for Rated Doors.
7. DHI – Door and Hardware Institute
8. SDI- Steel Door Institute
9. ANSI - American National Standards Institute
10. BHMA – Builders Hardware Manufacturers Association
11. Local Building Codes

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Finish Hardware Schedule to be in vertical format to include:
1. Heading #/Hardware Set
2. Door #, Location, Hand, Degree of Opening, Door Size and Type, Frame Size and Type, Fire Rating
3. Quantity, type, style, function, product, product number, size, fasteners, finish and manufacturer of each hardware item.
4. Location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
5. Keying schedule
6. Title Sheet, Index, Abbreviations, Manufacturers List, Template List and Templates.
7. Mounting locations for hardware.
8. Explanation of abbreviations, symbols, and codes contained in schedule.

C. Product Data: Product data shall be provided, in the form of a binder, manufacturer's technical product fact sheets for each item of hardware. Include whatever information may be necessary to show compliance with requirements, including instructions for installation and for maintenance of operating parts and finish.

D. Wiring Diagrams: Riser/Elevation and Point to Point Wiring Diagrams shall be provided. Include whatever information may be necessary for coordination with other trades.

E. Samples: Samples shall be provided as requested by owner or architect with Heading # and Door# marked on boxes. All samples shall be returned to the contractor and used on doors for which they were marked

F. Templates: Templates of finish hardware items to be supplied are to be furnished to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware.

G. Keying Schedule: A keying schedule shall be submitted using keyset symbols referenced in DHI manual "Keying Systems and Nomenclature." The keying schedule shall be indexed by door number, keyset, hardware heading number, cross keying instructions and special key stamping instructions.

H. Operations and maintenance data: At the completion of the job, furnish to the owner two copies of an owner's operation and maintenance manual. The manual shall consist of a labeled hardcover three ring binder with the following technical information:
   1. Title page containing: Project name, address and phone numbers. Supplier's name, address and phone numbers.
   2. Table of Contents.
   3. Copy of final Finish Hardware Schedule and Keying Schedule
   4. Maintenance instruction for each item of hardware.
   5. Catalog pages for each product.
   6. Installation Instructions and Parts List for all Locks, Exit Devices and Door Closers.

1.4 QUALITY ASSURANCES

A. Substitutions: Request for substitutions shall not be accepted within this project. Architect, owner and Hardware Consultant have selected one (1) specified and two (2) equals listed hereinafter in the Hardware Schedule. By this selection process they have established three (3) equal products for competitive pricing, while insuring no unnecessary delays by a substitution process. If any specified product is listed as a "No Substitution" product, this product will be supplied as specified, with no alteration or request of substitution. The reason for this is to comply with the uniformity established at this project. Parts and supplies are inventoried for these particular products for ease and standardization of replacement.

B. Supplier Qualifications: Supplier shall be recognized architectural finish hardware supplier, with warehousing facilities, who have been furnishing hardware in the

project vicinity for a period of not less than 2 year and who is or employs a DHI Certified AHC or person with a minimum of 10 years of experience as a hardware suppliers. This person shall be available at reasonable times during the course of the work for consultation about products hardware requirements, to the owner, architect and contractor.

C. Installer Qualifications: Installer for mechanical hardware shall have a minimum of 2 years of experience of installing architectural finish hardware and attend a pre-installation meeting with the manufacturer's representative of locks, exit devices and closers.

1.5 DELIVERY, STORAGE AND HANDLING

A. Marking and packaging: Mark each item or package separately, with identification related to hardware set number, door number and keyset symbol.

B. Delivery:
1. Deliver individually packaged and properly marked finish hardware at the proper time and location to avoid any delays in construction or installation.
2. At time of delivery, inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

C. Storage: Store hardware in enclosed, dry and locked area.

1.6 WARRANTY

A. All finish hardware products shall be covered by a 1 year factory warranty from the date of substantial completion of the project.

B. Supply warranty verification to the owner for products that provide factory warranties for periods longer than one year. Mechanical Door Closers shall carry a 10-year warranty.

1.7 MAINTENANCE:

A. Maintenance Service
1. None

B. Extra Materials:
1. All installation tools provided by the manufacturers shall be turned over to the owner at the completion of the job.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Manufacturer Location Abbreviation Website

Bommer Ind, Inc.	Landrum, SC	BOM	www.bommer.com
Doromatic	Princeton, IL	COR	www.doromatic.com
Falcon	Security, CO	FAL	www.falconlock.com
Glynn Johnson	Indianapolis, IN	GLY	www.glynn-johnson.com
Hager Hinge Co	St Louis, MO	HAG	www.hagerhinge.com
Ives	Indianapolis, IN	IVE	www.iveshardware.com
LCN	Princeton, IL	LCN	www.lcnclosers.com
Monarch	Sheperdsville,	MON	www.monarchhardware.com
National Guard	Memphis, TN	NGP	www.ngpinc.com
Pemko	Ventura, CA	PEM	www.pemko.com
Rockwood	Rockwood, PA	ROC	www.rockwoodmfg.com
Sargent	New Haven, CT	SAR	www.sargentlock.com
Schlage	Security, CO	SCH	www.schlage.com
Trimco/BBW/Quality	Los Angeles, CA	TRI	www.trimcobbw.com
Von Duprin	Indianapolis, IN	VON	www.vonduprin.com

2.2 MATERIALS

A. Screws and Fasteners:
1. Closers and exit devices provided for exterior doors shall be provided with thru-bolts.
2. All finish hardware shall be installed to manufacturers recommendations, using screws, attachments and installation tools provided with the hardware. No other screws or attachments are acceptable.
3. All other products to meet door and frame conditions.

B. Hinges:
1. Template: Provide templated units only.
2. Exterior: All exterior hinges shall be standard weight (.134 or .146 ga) five knuckle, ball bearing, full mortise type, stainless steel.
3. Interior: All interior hinges shall be standard weight (.134 or .146 ga) five knuckle, ball bearing, full mortise type.
4. Provide non-removable pins for outswinging doors at secured areas or as called for in this specification.
5. Size: Provide 4 ½ x 4 ½ hinges on doors up to 3'0" in width. Provide 5 x 4 ½ hinges on door from 3'2" to 4'0" in width. Reference manufacturers catalog for all other sizes.
6. Number of Hinges: Provide number of hinges indicated but not less than 3 hinges for door leaf for doors 90" or less in height and one additional hinge for each 30" of additional height.
7. The width of hinge shall be sufficient to clear all trim.
8. Supply from the following list of manufacturers:
Ives
Hager
Bommer

C. Continuous Hinges
1. Hinges to be manufactured of 6063-T6 aluminum alloy with anodized finish.

2. Door and frame leaves to be machined, anodized and assembled as a matched pair.
3. Door and frame leaves to be anodized after all machining and drilling processes are complete.
4. all hinge profiles shall be manufactured to template screw locations, with standard duty and heavy duty hole patterns identical as to number and placement of holes.
5. All hinge profiles to be manufactured to template bearing locations, with standard duty bearing configurations at 5 1/8" spacing with a minimum of 16 bearings; and heavy duty at 2 9/16" spacing with a minimum of 32 bearings.
6. Hinge leaves to be extruded at a uniform 1/8" thickness from pivot point to outside edge of hinge leaf.
7. Uncut hinges shall be non-handed and shall be a pinless assembly of three interlocking extrusions applied to the full height of the door and frame without mortising.
8. Vertical door loads shall be carried on chemically lubricated thermoplastic thrust bearings.
9. The door and frame leaves shall be continuously geared together for the entire hinge length and this relationship secured with a full-length cover channel so that the hinge will operate through a full 180 degrees.
10. All rotating areas of the gear cap and geared leaves shall have a permanent lubricant which is factory applied along the full length of the hinge, and the lubricant shall last the life of the hinge with no additional maintenance required.
11. Fastners supplied shall be 410 stainless steel, brite hardened and plated.
12. Supply from the following list of manufacturers:
    Ives
    Select
    Zero

D. Flush Bolts
1. Provide constant latching flush bolts that remains latched until the door is opened, then the top bolt can be manually released. The bottom bolt is automatic as shown in hardware sets
2. UL listed for fire doors as required.
3. Fits standard ANSI A115.4 Door and Frame preparation.
4. Meets ANSI156.3, Type 27
5. As codes and conditions permit, provide on the inactive door of pairs, extension flush bolts at top of doors. Provide all necessary strikes, shim and guides to insure proper installation.
6. Supply from the following manufacturer:
    Ives
    Trimco
    Rockwood

E. Coordinator
1. Provide coordinator that is a bar type.
2. UL listed for fire doors.
3. Meets ANSI/BHMA A156.3, Type 21A

4. Supply from the following manufacturer:
   Ives
   Trimco
   Rockwood

F. Cylindrical Locks/Latches
1. Provide cylindrical locksets that comply with ANSI A156.2, Series 4000, Grade 1; tested to exceed 3,000,000 cycles. Functions as listed in Hardware Sets.
2. Provide cylindrical locksets that meet ANSI A117.1, Accessibility Code.
3. Provide cylindrical locksets that meet UL A label; to have a minimum listing for single doors 4' x 8'
4. Provide cylindrical locksets that comply with California Fire Safety Code; lever return to within 1/2" of the door where applicable.
5. Lockset to have the ability to incorporate either a rigid or free-wheeling lever when in locked mode where shown in hardware sets.
6. Chassis to be field-changeable to free-wheeling lever.
7. Chassis to be one-piece, modular assembly.
8. Chassis to be multi-functional; interchange of function assembly without disassembly of lockset.
9. Spindle to be deep-draw manufactured. Manufacturers utilizing stamped spindles are not acceptable.
10. Spring Cage to have double compression springs. Manufacturers utilizing torsion springs are not acceptable.
11. Spindle and Spring Cage (internal) to be one-piece integrated assembly.
12. Levers to be bi-directional, independent assemblies.
13. Lever to be free-wheeling when locked where shown in hardware sets.
14. Levers are to be solid. Manufacturers utilizing fillers of any kind are not acceptable.
15. Levers are to be plated to match BHMA finishes.
16. Levers to have grooved tactile warnings on back side of lever where shown in hardware sets. Manufactures that insert devices and/or apply materials for warning are not acceptable.
17. Anti-rotation plate to be interlocking to lock chassis. Manufacturers utilizing anti-rotation plates with bit-tabs are not acceptable.
18. Thru-bolts to be a minimum of ¼" in diameter.
19. Thru-bolts to secure anti-rotation plate without sheer line. Manufacturers utilizing fully threaded thru-bolts are not acceptable.
20. Adjustment plate to be threaded for door thickness adjustment.
21. Adjustment plate to adjust for doors from 1 5/8" thickness to 2 1/8" thickness.
22. Adjustment plate to have visual chassis marking for doors 1 ¾" thick.
23. Latchbolt to be steel with minimum ½" throw deadlatch on keyed and exterior functions; ¾" throw anti-friction latchbolt on pairs of doors.
24. Strike to be ANSI curved lip, 1 ¼" x 4 7/8", 16 gauge, with 1" deep box construction.
25. Supply from the following list of manufacturers:
    Schlage – ND Rhodes
    Falcon – T
    Sargent – 11 Line

G. Exit Devices
1. All exit devices are to be architectural grade touch bar type.
2. All exit devices to meet ANSI A156.3, 1994, Grade 1. All exit devices are UL listed for Accident Hazard or Fire Exit Hardware.
3. All lever trim to match lock trim in design and finish.
4. Dogging: All non-rated devices are to be provided with dogging. Cylinder dogging as shown in hardware sets.
5. All devices are to be supplied and installed with thru-bolts.
6. Mullion shall be removable. Keyed removable as shown in hardware sets.
7. All push pads shall be metal, no plastic inserts allowed.
8. Function and type as listed in hardware sets.
9. Supply from the following list of manufacturers:
   Von Duprin 99 Series
   Monarch 18 Series
   Sargent 80 Series

H. Pull Plates
1. Pull Plates to meet ANSI 156.6 for .050" thickness. Plate size to 4" x 16" with 1" round on pull plate.
2. Supply from the following list of manufacturers
   Ives
   Trimco
   Rockwood

I. Push Plates
1. Push Plates to meet ANSI 156.6 for .050" thickness. Plate size to be 4" x 16".
2. Supply from the following list of manufacturers
   Ives
   Trimco
   Rockwood

J. Door Closers
1. Door closers shall meet the minimum requirements of the 1990 ADA act, in lieu of ANSI Standard A156.4 and ANSI, Grade 1.
2. Door closers shall be furnished with full cover. Sized in accordance with the manufacturers recommendations for door size and condition.
3. Door closers shall be furnished with backcheck, delayed action, hold-open and advanced backcheck as listed in the Hardware Schedule.
4. Door closers shall be mounted out of the line of sight wherever possible (i.e., room side of corridor doors, etc.) with parallel arm mounting on out swinging doors. Mount closer top jamb or on brackets and/or drop plates, where special conditions call for it. All closer installation on wood doors shall include sex nut bolts.
5. Supply from the following list of manufacturers
   LCN 4040/1460
   Doromatic SC71/SC81
   Sargent 351/1431

K. Door Protection Plates
1. Protective plates shall meet ANSI A156.6 requirements for .050 thickness.
2. Kickplates shall be 10" by 2" less than door width on single door and 1" less than door width on pair of doors or as indicated in hardware sets. Beveled 3 edges. Adjust Kickplate height to fit bottom rails when lites or louvers conflict.
3. Armor plates shall be 34" by 2" less than door width or as indicated in hardware sets. Beveled 4 edges.
4. Supply from the following list of manufacturers:
Ives
Rockwood
Trimco

L. Door Stops and Holders:
1. Wall and Floor Stops: Supply wall stops where needed to protect doors or door hardware. When wall conditions do not permit use of wall stop provide floor stops with risers as needed to adjust for floor conditions.
2. Overhead Stops: Where wall or floors stops are not applicable provide surface overhead stops.
3. Supply from the following list of manufacturers:
Ives
Glynn Johnson
Trimco

M. Silencers
1. Provide silencers on all doors without smoke seal or weatherstrip. 3 for single doors and 2 for pairs.
2. Provide silencers as required for frame conditions
3. Supply from the following list of manufacturer's
Ives
Rockwood
Trimco

N. Thresholds/Weatherstripping
1. All thresholds shall conform to state and local handicap codes.
2. Smoke seal shall be teardrop design bulb seal.
3. Perimeter seal shall be vinyl.
4. Drip strips shall protrude 2 ½".
5. Provide door sweeps with drip cap.
6. Provide UL meeting stile gasketing for fire rated doors.
7. Supply from the following list of manufacturer's
National Guard
Hager
Pemko

2.3 FINISHES

CATEGORY	FINISH
Butts	
Interior Non Labeled	652

Interior Labeled	652
Interior Corrosive Area	630
Exterior	630
Continuous Hinges	ALUM
Flush Bolts/Dust Proof Strikes	626
Locks/Latches	626
Cylinders	626
Exit Devices	626/630
Door Closers	ALUM
Push Plates	630
Pull Plates	630
Protective Plates	630
Door Stops and Holders	626
Overhead Stops/Holders	626
Weatherstrip and Threshold	ALUM

2.4 KEYING:

A. General: Supplier will meet with owner to finalize keying requirements and provide a new Master Key System for the project.

B. Keys: Provide nickel silver keys only. Furnish 3 change keys for each lock: 5 master keys for each master system and 5 grandmaster keys for each grandmaster key system. Deliver all keys to owners' representative.

C. Provide Construction Masterkey system which permits voiding of the construction key system without removal of the cylinders. Removal of construction masterkey system is to be performed by the general contractor as directed by the owner.. Provide 12 construction masterkeys.

2.5 KEY CONTROL:

A. Key Management: Key control shall be provided, by supplying a complete key storage and management system. Each key shall be fully cut, indexed, tagged and installed on cabinet hooks by the lock supplier and shipped with the locks. Key cabinet provided shall be wall-mounted type with capacity plus 50%.

B. Key Lock Boxes: Designed for storage of two keys, with tamper switches to connect to intrusion detection system. 3200-series.

C. Knox Company (KNX).

2.6 ACCESS CONTROL:

A. Provide LockLink Express (Schlage) security management software.

PART 3 – EXECUTION:

3.1 EXAMINATION:

A. Examine doors, frames and related items for conditions that would prevent the proper application of any finish hardware items. Do not proceed with installation until all defects are corrected.

3.2 INSTALLATION:

A. Follow Door and Hardware Institute Publication for:
Recommended Location for Architectural Hardware for Standard Steel Doors and Frames
Recommended Location for Builder's Hardware for Custom Steel Doors and Frames
Recommended Locations for Architectural Hardware for Wood Flush Door

B. Follow ANSI A117.1-1998 Accessible and Usable Building and Facilities

C. Review mounting locations with Architect.

D. Pre Installation meeting required with attendees to include Architect, Contractor, Carpenter, Supplier and Manufacturer's Representative for Exit Device, Locks and Closers before installation begins.

3.3 FIELD QUALITY CONTROL:

A. After installation has been completed, obtain the services of a qualified hardware consultant to check for proper application of finish hardware, according to the finish hardware schedule and keying schedule. In addition, check all hardware for adjustments and proper operation.

3.4 ADJUST AND CLEAN:

A. Adjust, clean and inspect all hardware, to ensure proper operation and function of every opening. Replace items, which cannot be adjusted to operate freely and smoothly as intended for the application made.

3.5 PROTECTION:

A. The contractor shall use all means at his disposal to protect all finish hardware items from abuse, corrosion and other damage until the owner accepts the project as complete.

3.6 HARDWARE SCHEDULE

HW SET: 1

DOOR NUMBER:
102 111B

EACH TO HAVE:
1 EA CONTINUOUS HINGE 224HD-DOOR HEIGHT REQUIRED 628 IVE

1	EA	DEADLOCK	MS1850SN	628	AR
2	EA	MORTISE CYLINDER	985 CMK	626	FA
1	PR	OFFSET PULLS	8190-0-M (BACK-TO-BACK)	630	IVE
1	EA	SURFACE CLOSER	SC71 X SNB	689	DOR
1	EA	MOUNTING PLATE	18PA	689	DOR
1	EA	FLOOR STOP/HOLDER	FS446	626	TRI
1	EA	DOOR SWEEP	100VA-LENGTH REQUIRED	628	NGP
1	EA	THRESHOLD	425 SIA -LENGTH REQUIRED	628	NGP
1	SET	WEATHER STRIP	BY DOOR MFG		B/O

HW SET: 2

DOOR NUMBER:
102

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8303-8 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	SC81 RW/PA	689	DOR
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 4

DOOR NUMBER:
105 106 107 109 110 111
112114 115 116

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	T521 QUA CMK	626	FA
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCERS	SR64		IVE

HW SET: 05

DOOR NUMBER:
108, 113

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	EXIT HARDWARE	99L-F X SNB	628	VON
1	EA	RIM CYLINDER	951 CMK	626	FA
1	EA	SURFACE CLOSER	SC71 DS SNB	689	DOR

1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	160-HEAD & JAMBS	BRN	NGP
1	EA	SWEEP	100VA-LENGTH REQD	628	NGP
1	EA	THRESHOLD	425-LENGTH REQD	628	NGP

HW SET: 06

DOOR NUMBER:
117

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	T581 QUA CMK	626	FA
1	EA	SURFACE CLOSER	SC71 DS SNB	689	DOR
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	160-HEAD & JAMBS	BRN	NGP
1	EA	SWEEP	100VA-LENGTH REQD	628	NGP
1	EA	THRESHOLD	425-LENGTH REQD	628	NGP

HW SET: 7

DOOR NUMBER:
118 119 120

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	T521 QUA CMK	626	FA
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEAL	5050	BWN	NGP
1	EA	DOOR BOTTOM	442N	ALUM	NGP

END OF SECTION

SECTION 088100 Glazing

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Double-Glazed Solar Control Insulating Glass Units.

1.2 RELATED SECTIONS

A. Section 08850 - Glazing Accessories.

1.3 REFERENCES

A. ANSI Z 97.1 - Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.

B. ASTM C 1036 - Standard Specification for Flat Glass.

C. ASTM C 1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass.

D. ASTM C 1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass.

E. ASTM E 773 - Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units.

F. ASTM E 774 - Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units

G. ASTM E 2188 – Standard Test Method for Insulating Glass Unit Performance.

H. ASTM E 2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.

I. CPSC 16CFR-1201 - Safety Standard for Architectural Glazing Materials.

J. Glass Association of North America (GANA) Glazing Manual.

1.4 DEFINITIONS

A. Sealed Insulating Glass Unit Surfaces:
   1. Surface No. 1: Exterior surface of outer lite.
   2. Surface No. 2: Interior surface of outer lite.

3. Surface No. 3: Exterior surface of inner lite.
4. Surface No. 4: Interior surface of inner lite.

B. Airspace: Space between lites of an insulating glass unit that contains dehydrated air or other inert specified gas.

1.5 SUBMITTALS

A. Comply with Section 01330 - Submittal Procedures.

B. Product Data: Submit manufacturer's product data, including performance characteristics and installation instructions.

C. Shop Drawings: Submit manufacturer's or fabricator's shop drawings, including plans, elevations, sections, and details, indicating glass dimensions, tolerances, types, thicknesses, and coatings.

D. Samples: Submit manufacturer's samples of each type, thickness, and coating.

E. Fabricator's Certification: Submit fabricator's certification by manufacturer.

F. Cleaning Instructions: Submit manufacturer's cleaning instructions.

G. Warranty: Submit manufacturer's standard warranty for sealed insulating glass units.

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Minimum of 5 years experience manufacturing solar control coated glass.

B. Fabricator's Qualifications:
1. Minimum of 5 years experience manufacturing sealed insulating glass units meeting ASTM E 2190, Class CBA.
2. Certified by manufacturer.

C. Mock-Ups:
1. Comply with Section 01450 - Quality Control.
2. Obtain acceptance of mock-ups by Architect before proceeding with work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
1. Deliver glass to site in accordance with manufacturer's instructions.
2. Deliver glass in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage:

1. Store glass in accordance with manufacturer's instructions.
2. Store glass in clean, dry area indoors.
3. Protect from exposure to direct sunlight and freezing temperatures.
4. Apply temporary coverings loosely to allow adequate ventilation.
5. Protect from contact with corrosive chemicals.
6. Avoid placement of glass edge on concrete, metal, and other hard objects.
7. Rest glass on clean, cushioned pads at 1/4-points.

C. Handling:
1. Handle glass in accordance with manufacturer's instructions.
2. Protect glass from damage during handling and installation.
3. Do not slide 1 lite of glass against another.
4. Do not use sharp objects near unprotected glass.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Guardian Industries Corp., 14600 Romine Road, Carleton, Michigan 48117. Toll Free (800) 521-9040. Phone (734) 654-6264. Fax (734) 654-0935. Web Sites www.guardian.com, www.sunguardglass.com.

B. Substitutions:
1. Not permitted.

2.2 FABRICATORS

A. Sealed Insulating Glass Units, Heat-Strengthened Glass, Tempered Glass, and Spandrel Glass:
1. Acceptable Fabricators: Certified by Guardian Industries Corp. to fabricate SunGuard Solar Control Coated Glass products.

2.3 SOLAR CONTROL INSULATING COATED GLASS

A. Double-Glazed Sputter-Coated Insulating Glass Units:
1. Conformance: ASTM E 2190, Class CBA.
2. Outboard Lite: Sputter-coated clear float glass.
a. Annealed Clear Float Glass: ASTM C 1036, Type 1, Class 1, Quality q3.
b. Vacuum Deposition Sputtered Coating: ASTM C 1376.
c. Coating on Surface No. 2: Sun Guard SuperNeutral 68 (SN 68).
d. Glass Thickness: 6 mm (1/4 inch).
e. Heat Treatment: Heat-strengthened, ASTM C 1048, Kind HS.
3. Air Space: 12 mm (1/2 inch) wide, hermetically sealed, dehydrated air space.
4. Inboard Lite: Clear float glass.
a. Annealed Clear Float Glass: ASTM C 1036, Type 1, Class 1, Quality q3.
b. Glass Thickness: 6 mm (1/4 inch).
c. Heat-Treatment: None

5. Glass Unit Performance Characteristics:
   a. Visible Light Transmittance: 44 percent
   b. Visible Light Reflectance Outdoors: 8 percent
   c. Direct Solar Energy Transmittance: 21 percent
   d. Direct Solar Energy Reflectance Outdoors: 13 percent
   e. Winter U-Value Nighttime: 0.29
   f. Summer U-Value Daytime: 0.28
   g. Shading Coefficient: 0.37
   h. Solar Heat Gain Coefficient: 0.33
   i. Summer Relative Heat Gain: 78
6. Edge Seals: ASTM E 773, with aluminum spacers and silicone sealant for glass-to-spacer seals.
7. Sealant: Approved by glass manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive glass. Notify Architect of conditions that would adversely affect installation. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Verify glazing openings are correct size and within tolerance.

B. Verify glazing channels, recesses, and weeps are clean and free of obstructions.

3.3 GLAZING

A. Install glass in accordance with manufacturer's instructions, except where local codes or GANA Glazing Manual indicate more stringent requirements.

3.4 FIELD QUALITY CONTROL

A. Coated glass, when viewed from minimum of 10 feet, exhibiting slightly different hue or color not apparent in hand samples, will not be cause of rejection of glass units, as determined by Architect.

B. Verify glass is free of chips, cracks, and other inclusions that could inhibit structural or aesthetic integrity.

3.5 CLEANING

A. Clean glass promptly after installation in accordance with manufacturer's instructions.

B. Remove labels from glass surface.

C. Do not use harsh cleaning materials or methods that would damage glass.

3.6 PROTECTION

A. Protect installed glass from damage during construction.

B. Protect installed glass from contact with contaminating substances resulting from construction operations.

C. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.

END OF SECTION

SECTION 08900

Louvers

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Metal louver vents.

B. Related Sections:
1. Section Structural Metal Stud Framing.
2. Section Rough Carpentry.
3. Section Gypsum Board Assemblies.

1.2 REFERENCES

A. ASTM International (ASTM):
1. ASTM C473 Standard Test Methods for Physical Testing of Gypsum Panel Products.
2. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
3. 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.
4. ASTM C1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
5. ASTM C1280 Standard Specification for Application of Gypsum Sheathing.
6. ASTM E72 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
7. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.

1.3 SUBMITTALS

A. Product Data: Manufacturer's specifications and installation instructions for each product specified.

PART 2 PRODUCTS

2.1 MATERIALS
A. Glass-Mat Faced Gypsum Sheathing: ASTM C1177:
1. Thickness: 1/2 inch.
2. Width: 4 feet.
3. Length: 8 feet.
4. Weight: 1900 pounds per M square feet.
5. Edges: Square.

6. Surfacing: Coated glass mat on face, back, and long edges.
7. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 540 pounds per square foot, dry.
8. Flexural Strength, Parallel (ASTM C473): 80 lbf, parallel.
9. Humidified Deflection (ASTM C1177): Not more than 1/4 inch.
10. Permeance (ASTM E96): 23 perms.
11. R-Value (ASTM C518): 0.56.
12. Acceptable Products:
    a. 1/2 inch DensGlass Gold, Georgia-Pacific Gypsum.

2.3 ACCESSORIES

A. Screws: ASTM C1002, corrosion resistant treated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
1. Inspection: Verify that project conditions and substrates are acceptable, to the installer, to begin installation of work of this section.

3.2 INSTALLATION

A. General: In accordance with ASTM C1280 and the manufacturer's recommendations.

1. Manufacturer's Recommendations:
   a. Current "Product Catalog", Georgia-Pacific Gypsum.

3.3 PROTECTION

A. Protect gypsum board installations from damage and deterioration until date of Substantial Completion.

END OF SECTION 061643

SECTION 092600 GYPSUM BOARD ASSEMBLIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Construction Agreement and Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Interior gypsum wallboard.
   2. Gypsum board panels for ceilings and soffits.
   3. Tile backing panels.
   4. Non-load-bearing steel framing.
   5. Metal trim with bonded paper face.
   6. Gypsum exterior wall sheathing

B. Related Sections include the following:
   1. Division 5 Section " Metal Stud Framing" for load-bearing steel framing.
   2. Division 6 Section "Rough Carpentry" for plywood sheathing at vertical board-and-batten exterior wall panels.
   3. Division 7 Section "Building Insulation" for insulation installed in gypsum board assemblies.

1.3 DEFINITIONS

A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Where accessory products are specified to be as recommended by a manufacturer, submit evidence of the manufacturer's recommendation with the associated product literature.

1.5 QUALITY ASSURANCE

A. Fire- Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Fire-Resistance-Rated Assemblies: Indicated by design designations from FM's "Approval Guide, Building Products," UL's "Fire Resistance Directory," GA-600, "Fire Resistance Design Manual."

B. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
   1. STC-Rated Assemblies: Indicated by design designations from GA-600 r "Fire Resistance Design Manual."

C. Materials and installation shall conform to the following standards:

ASTM A924 Standard Specification for General Requirements for Steel Sheet, Metallic-coated by the Hot-dip Process.

1. ASTM C 645 Standard Specification for Non-structural Steel Framing Members.
2. ASTM C754 Standard Specification for Installation of Steel Framing Members to Receive Screw-attached Gypsum Panel Products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1 .7 PROJECT CONDITIONS

A. Environmental limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

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. Gypsum Board and Related Products:
      a. American Gypsum Co.
      b. G-P Gypsum Corp.
      c. National Gypsum Company.
      d. United States Gypsum Co.
      e. James Hardie Gypsum
      f. Temple-Inland Forest Products Corporation
      g. Louisiana Pacific
   2. Metal trim with paper face: United States Gypsum Co. "Sheetrock" Paperfaced Metal Drywall Bead and Trim.
      a. Contractor's option: In lieu of metal trim with paper face, provide "No-Coat" Structural Drywall Corners by Drywall Systems International.

2.3 GYPSUM WALLBOARD

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Gypsum Wallboard: ASTM C 36.
   1. Regular Type:
      a. Thickness: 5/8 inch, unless indicated otherwise.
      b. Long Edges: Tapered.
      c. location: Vertical surfaces, unless otherwise indicated.
   3. Type X:
      a. Thickness: 5/8 inch, unless indicated otherwise.

b. long Edges: Tapered.
c. location: As indicated and where required for fire-resistance-rated assembly.

4. Proprietary, Special Fire-Resistive Type: ASTM C 36, having improved fire resistance over standard Type X.
   a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work indude, but are not limited to, the following:
      i. American Gypsum Co.; FireBloc Type C.
      ii. G-P Gypsum Corp.; Firestop Type C.
      iii. National Gypsum Company; Gold Bond Fire-Shield G.
      iv. United States Gypsum Co.; SHEETROCK Brand Gypsum Panels, FIRECODE C Core.
   b. Thickness: 5/8 inch, unless indicated otherwise.
   c. long Edges: Tapered.
   d. location: As indicated and Where required for specific fire-resistance-rated assembly indicated.

2.4 TILE BACKING PANELS

A. Unless indicated otherwise, at walls that receive ceramic tile, finish provide moisture resistant wallboard where the ceramic tile-finished wallboard will not be subjected to water, such as in public toilet rooms, and
   1. in bathrooms except walls in wet areas that require silicone-treated wallboard. Provide tile backer board at three
   2. walls above bathtubs, at shower enclosure walls and curbs, and at other walls subject to wetting by plumbing fixtures.
   3. Panel size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Water-resistant Gypsum Backing Board: ASTM C 630.
   1. Core: 5/8 inch
   2. Type X where indicated.

C. Silicone-treated core and moisture-resistant copolymer coating on the face.
   1 . "Dens-Shield" by Georgia Pacific.
   2. Thickness: 5/8 inch

D. Cementitious Backer Units: ANSI A118.9
   1. "Durock" Exterior Cement Board; United States Gypsum Co.
   2. Thickness: 5/8 inch

2.5 GYPSUM BOARD SHEATHING

A. Gypsum Sheathing Board (Contractor's option):
   Glass-Mat Gypsum Sheathing Board: Manufactured in accordance with ASTM C 1177.
   1. Product: "Dens-Glass Gold" by G-P Gypsum Corp.
      a. 5/8 inch thick, unless noted otherwise.
      b. Fiber-Reinforced Gypsum Wall Sheathing: meets ASTM C1278, and meets or exceeds physical property requirements of ASTM C79, ASTM Cl177, and ASTM C931.
   2. Product: "Fiberock" Sheathing, USG

a. 5/8 inch thick, unless noted otherwise.

2.6 TRIM ACCESSORIES

A. Interior Trim: "USG "Sheetrock" Paper-faced Metal Drywall Bead and Trim.

B. Corner beads: USG "Sheetrock B-1 "Superwide".

Contractor's option: In lieu of metal trim with paper face, provide copolymer plastic trim with bonded paper face.

1. "No-Coat" Structural Drywall Corners by Drywall Systems International. Phone 888-662-6281. Web site address www.no-coat.com.
2. Material: Copolymer plastic with paper face and joint tope backing, engineered for fully bonded adhesive application with joint compound and without mechanical fasteners. Bonding surface of corner bead shall be not less than 48 square inches per linear foot.
   a. Shapes:
      i. Corner bead: "PowerSeries" Corner.
      ii. LC-Bead: "L Trim SmartSeries.".
      iii. Expansion (Control) Joint: Use where indicated.

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:
   a. Interior Gypsum Wallboard: Paper.
   b. Exterior Gypsum Soffit Board: Paper.
   c. Tile Backing Panels: As recommended by panel manufacturer.
   d. Paper-faced Metal Corner Bead does not require joint tape.
   e. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coots.
   f. Pre-filling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.

C. Embedding and First Coat: For embedding tope and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.

D. Use USG "Durabond" setting compound for installing paper-faced trim accessories. Follow corner trim manufacturer's recommendations for materials and installation methods~

E. Fill Coat: For second coat, use drying-type, all-purpose compound.

F. Finish Coat: For third coat, use drying-type, all-purpose compound.

G. Joint Treatment for Cementitious Backer Units: As recommended by panel manufacturer.

H. Joint treatment for abuse-resistant wallboard: As recommended by the wallboard manufacturer.

2.10 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated. Use screws complying with ASTM C 954. for fastening panels to steel members from 0.033 to 0.112 inch thick.
D. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.
E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
   1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
F. Thermal Insulation: As specified in Division 7 Section "Building Insulation."

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

3.2 PREPARATION
A. Suspended Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorage to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.
B. Furnish concrete inserts and other devises indicated to other trades for installation in advance of time needed for coordination and construction.

3.6 INSTALLATION, SHEATHING
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 manufacturer/s installation instructions.
D. Coordinate wall 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.
E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.7 GYPSUM SHEATHING INSTALLATION
A. Comply with GA-253 and with manufacturer's written instructions.
B. Install gypsum sheathing where indicated/ including behind lapped siding:
C. Fasten gypsum sheathing to wood framing with screws.

E. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
F. Install boards with a l/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
G. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.
H. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs/ and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
I. 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.
J. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

3.8 INSTALLATION - WALLS
A. Install drywall furring channels perpendicular to framing members.
B. Space drywall furring channels maximum of 24 inches on center.
1. Locate first drywall furring channel parallel to floor and maximum of 3 inches above floor and 1 drywall furring channel maximum of 6 inches from ceiling.

3.9 INSTALLATION - CEILINGS
A. Install drywall furring channels perpendicular, parallel, or angular to framing members.
B. Space Drywall Furring Channels:
1. Maximum of 24 inches on center with:
2. Single layer of 5/8-inch gypsum board.
3. Double layer of 5/8-inch gypsum board, weighing less than 2.25 pounds per square foot per layer.
4. Single layer of 1/2-inch high-strength gypsum board.
5. Double layer of 1/2-inch high-strength gypsum board.
6. Maximum of 16 inches on center with:
i. Double layer of 5/8-inch gypsum board.
ii. Single layer of 112-inch regular-strength gypsum board.
iii. Double layer of 1/2-inch regular-strength gypsum board.
iv. Reduce spacing of drywall furring channels to prevent potential for sagging of gypsum board or when additional loads are supported by resilient sound isolation clips.
C. Locate drywall furring channels maximum of 3 inches from parallel wall assemblies.

3.10 APPLYING AND FINISHING PANELS, GENERAL
A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.
B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling.

Stagger abutting end joints of adjacent panels not less than one framing member.

D. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1116 inch of open space between panels. Do not force into place.

E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

F. Attach gypsum panels to steel studs so leading edge or end of each panel IS attached to open (unsupported) edges of stud flanges first.

G. Attach gypsum panels to framing provided at openings and cutouts.

H. Form control and expansion joints with space between edges of adjoining gypsum panels.

I. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 112-inch- wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at all perimeter edges of both faces of partitions and through-penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

1. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.

K. Space fasteners in panels that are tile substrates maximum of 8 inches o.c.

3.11 PANEL APPLICATION METHODS

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels in a manner which minimizes the number of end-butt joints, unless otherwise indicated or required by fire resistance-rated assembly, and minimize end joints. At high walls install boards horizontally, with end joints staggered over studs.
3. Stagger abutting end joints not less than one framing member in alternate courses of board.
4. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.

D. Single-layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

G. Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel at showers, tubs, and where indicated.: Comply with manufacturer's written installation instructions and install at showers, tubs, and where indicated. Install with 1/ 4-inch gap where panels abut other construction or penetrations.
2. Bathroom Areas Not Subject to Wetting: Install standard moisture-resistant gypsum wallboard panels to produce a flat surface, except at showers, tubs, and other locations indicated to receive water-resistant panels.
3. Where tile backing panels abut other types of panels in the same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.12 INSTALLING TRIM ACCESSORIES

A. General: Comply with trim manufacturer's installation instructions.
B. Control Joints: Install control joints at locations indicated on Drawings. If not shown, install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect. Provide gypsum backing where control joints occur in fire-resistive partitions, as required to maintain fire rating, in accordance with Gypsum Association details and recommendations.

3.13 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
B. Pre-fill open joints, rounded or beveled edges, and damaged surface areas.
C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
D. Gypsum Board Finish levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
   1. level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where concealed from view unless a higher level of finish is required for fire resistance-rated assemblies and sound-rated assemblies.
   2. level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for ceramic tile or wood panels.
   3. level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.

3.14 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Before Contractor installs gypsum board ceilings, Architect will conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.
   1. Notify Architect seven (7) days in advance of date and time when Project, or part of Project, will be ready for above-ceiling observation.
   2. Before notifying Architect, complete the following in areas to receive gypsum board ceilings:

a. Installation of 80 percent of lighting fixtures, powered for operation.
b. Installation, insulation, and leak and pressure testing of water piping systems.
c. Installation of air-duct systems.
d. Installation of air devices.
e. Installation of mechanical system control-air tubing.
f. Installation of ceiling support framing.

END OF SECTION

SECTION 093100 CERAMIC TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division- 1 Specification sections, apply to work of this section.

1.2 SUMMARY OF WORK

A. Definition: Tile includes ceramic surfacing units made from clay or other ceramic materials.
B. Extent of tile work is indicated on drawings and schedules.
C. Types of tile work in this section include the following:
   1. Unglazed ceramic mosaic floor tile.
   2. Glazed wall tile.
   3. Waterproofing membrane for thin-set wall tile installations.
   4. Waterproof shower pan / membrane at shower floor
   5. Stone thresholds.
   6. Crack suppression system.
D. Refer to Drawings for location and tile patterns.
E. Division 7 Section" Joint Sealants".

1.3 QUALITY ASSURANCE

A. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.
B. Furnish engineered ceramic tile complying with standard grade requirements of ANSI A137.1 and as specified.
C. Where industry standards are referred to, use most current version of the referenced standard.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical information and installation instructions for materials required, except bulk materials.

B. Samples for Verification Purposes: Submit the following:

   1. Samples for each type of tile and for each color and texture required, not less than 12 inches square.
   2. 6-inch long samples of stone thresholds.
   3. Grout color samples.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or

contamination to materials by water, freezing, foreign matter or other causes.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturers printed recommendations.

B. Maintain temperatures at not less than 50 degrees F in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

1.7 ATTIC STOCK

A. Provide attic stock amounting to 2 percent of the installed amount of each type and color of tile, but no less than one full box of each type and color.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types and grades of tile indicated.
   1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.

B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
   1. Colors, Textures and Patterns: For tile, grout and other products requiring selection of colors, surface textures or other appearance characteristics, provide products to match characteristics indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standards.
   2. Provide tile trim and accessories which match color and finish of adjoining flat tile.
   3. Mounting: Where factory-mounted tile is required, provide back or edge-mounted tile assemblies as standard with manufacturer, unless another mounting method is indicated.

2.2 SETTING MATERIALS

A. Standard Thin-Set latex-Portland Cement Mortar or Bond Coat: ANSI A 118.4.
   1. Water emulsion acrylic latex additive: add at project site to prepackaged dry mortar mix recommended by latex manufacturer.
   2. For wall applications, provide non-sagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A 118.4.

3. latex-Portland Cement Mortar manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

B. Custom Building Products; "FlexBond" Thin Set Mortar. laticrete International, Inc.; laticrete 211 "Crete Filler" Powder with Laticrete 4237 Thin-Set Mortar Additive.
1. Mapei Inc.; "Kerabond" with "Keralasfic" additive.
2. TEC Specialty Products, Inc.; "Full Set" TA-370 with "Acrylbond AMA" TA-862.

C. Mortar Materials - Thick Set Beds:
1. Site mix of portland cement, sand and water as specified.
2. Manufacture's pre-packaged thick-bed mortar:
3. 226 Thick Bed Mortar by laticrete.
4. Mapecem Premix by Mapei
5. Portland Cement: ASTM C 150, Type 1, gray.
6. Sand: ASTM C 144, fine sand.
7. Hydrated Lime: ASTM C 207, Type S.
8. Waterproofing Compound: ANSI A 118.10.
9. Water: potable.
10. Slurry Bond Coot under bonded mortar beds. Acceptable Products:
    i. laticrete 4237 latex Thin Set Mortar Additive mixed with 211 Crete Powder.
    ii. Mapei Planicrete 50 Multi-Purpose latex Additive mixed with Portland Cement.

2.3 GROUTING MATERIALS

A. Sanded Grout: latex-portland cement sanded grout consisting of a blended mixture of portland cement, color-fast pigments, and high strength aggregates complying with ANSI A 118.7, complete with second generation latex additive. Color as selected by Owner.

B. laticrete 1500 Series Tri-Poly Fortified Sanded Grout with laticrete "1776 Grout Admix Plus"- Basis of Design.

C. Grout colors: As indicated, or if not indicated, to be selected from the manufacturer's full range.

D. Other Acceptable manufacturers and products:

G. Un-sanded Grout: Wall grout consisting of a blended mixture of portland cement, color-fast pigments, and high strength aggregates complying with ANSI A 118.7.

I. Acceptable manufacturers:
1. laticrete International, Inc.: 1600 Series Tri-Poly Fortified Non-Sanded Grout
2. Custom Building Products: "Polyblend" Non-sanded grout.
3. Mapei Inc.: KER 800 polymer-modified un-sanded grout.

2.4 WATERPROOFING MEMBRANE

A. Coordinate type and location of waterproofing membrane in showers with type of floor drain installed.

B. Trowel-Applied waterproofing membrane. Conform to ANSI A 118.10.

1. "Hydroment Ultra-Set" by Bostik.
2. 9235 Membrane by laticrete International.
3. "Mapelastic" by MapeL
4. "Nobleseal TS", Noble Co. (distributed by H. B. Fuller Co.).

C. Chlorinated-Polyethylene-Sheet Product: Non-plasticized, chlorinated polyethylene faced on both sides with high-strength, non-woven polyester fabric, for adhering to latex-portland cement mortar; 60 inches wide by 0.030-inch nominal thickness.

1. Product: Noble Company (The); Nobleseal TS.

D. Glazed Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:

1. Cove base to match wall tile.
2. Preformed inside and outside corners, and miscellaneous trim.

2.6 MISCELLANEOUS MATERIALS

A. Sealant in Conjunction with Tile: Provide mildew resistant silicone sealant under this Section in compliance with requirements specified under Section Sealants.

1. Color: Color to be selected by Architect.

B. Reinforcing Mesh: Welded wire fabric, 2 inch by 2 inch 16/16 gauge galvanized wire, complying with ASTM A 185 .

C. Tile Cleaner: Product specifically acceptable to manufacturer of tile and grout manufacturer for application indicated and as recommended by National Tile Promotion Federation, 112 North Alfred Street, Alexandria, VA 22134 or Ceramic Tile Institute, 700 N. Virgil Avenue, Los Angeles, CA 90029.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive tile work and conditions under which tile will be installed. Do not proceed with tile work until surfaces and conditions comply with requirements indicated in referenced tile installation standard.

B. Verify field dimensions and notify Architect of any discrepancies prior to installing tile.

3.2 INSTALLATION, GENERAL

A. ANSI Tile Installation Standard: Comply with applicable parts of ANSI A 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile".
B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated or, if not otherwise indicated, as applicable to installation conditions shown.
C. Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. 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 that plates, collars, or covers overlap tile.
E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise shown.
F. Layout tile wainscots to next full tile beyond dimensions indicated.

3.3 WATERPROOFING MEMBRANE INSTALLATION

A. Do not install tile over waterproofing until waterproofing has cured and has been tested to determine that it is watertight.

3.4 FLOOR INSTALLATION METHODS

A. Ceramic Mosaic Tile: Install tile to comply with requirements indicated below for TCA installation methods related to types of subfloor construction, and grout types.
B. Wet areas with floor drains, such as showers: TCA B420 or TCA B421 or TCA B422 Floor Setting Method:
C. Coordinate TCA method with waterproofing membrane installation and floor drain type.
E. Interior floor installation on concrete in dry areas; thin-set mortar; TCA Method Fl13 and ANSI A 108.5.
F. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile unless otherwise indicated. Threshold shall be located to be directly under the door leaf in the dosed position.

3.5 WALL TILE INSTALLATION METHODS

A. Setting method location: over coated glass mat backer board. Bathtub Walls with shower heads: TCA method B419-03 at Coated Glass Mat Backer Board (Georgia-Pacific IDenShield"), thin-set with

latex portland mortar bond coat over coated glass-mat tile backer board.

B. Shower Walls: TCA method B420-03 and W245-03.
Setting method location: Where tile occurs on walls over gypsum board in dry areas, unless indicated otherwise.

C. TCA Method W243: Thin-set with latex Portland cement mortar bond coat over gypsum wallboard over wood or metal studs.

3.6 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting clean all ceramic tile surfaces so they are free of foreign matter.

B. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions but no sooner than 14 days after installation. Protect metal surfaces cast iron and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.

C. Remove temporary wax coating from ceramic toilet using methods recommended by manufacturers of tile and grout.

D. Finished Tile Work: leave finished installation clean and free of cracked, chipped, broken un-bonded or otherwise defective tile work.

E. Protection: When recommended by tile manufacturer apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining damage and wear.

F. Prohibit foot and wheel traffic from using tiled floors for at least 7 days after grouting is completed.

G. Before final inspection remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION

SECTION 095113 -ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes:
   1. Acoustical ceiling panels.
   2. Exposed grid suspension system.
   3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

B. Related Sections:
   1. Section 09250 - Gypsum Board

C. Alternates
   1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products which have not been approved by Addenda, the specified products shall be provided without additional compensation.
   2. Submittals which do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
   2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
   3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
   4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
7. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
9. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
10. ASTM E 1264 Classification for Acoustical Ceiling Products.
11. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
12. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
13. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
B. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.
C. Shop Drawings: Layout and details of acoustical ceilings. Show locations of items which are to be coordinated with, or supported by the ceilings.
D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.
E. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
    1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
        a. Flame Spread: 25 or less
        b. Smoke Developed: 50 or less
C. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.7 PROJECT CONDITIONS

A. Space Enclosure:

Standard Ceilings: Do not install interior ceilings until space is enclosed and weatherproof; wet work in place is completed and nominally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy. Building areas to receive ceilings shall be free of construction dust and debris.
HumiGuard Plus Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot dipped galvanized steel, aluminum or stainless steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.
HumiGuard Max Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Ceilings with HumiGuard Max performance can be installed in conditions up to 120°F (49°C) and maximum humidity exposure including outdoor applications, and other standing water applications, so long as they are installed with either SS Prelude Plus, AL Prelude Plus, or Prelude Plus XL Fire Guard suspension systems. Products with HumiGuard Max performance can be installed in exterior applications, where standing water is present, or where moisture will come in direct contact with the ceiling. Only Ceramaguard with AL Prelude Plus suspension system can be installed over swimming pools.

1.8 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
    1. Acoustical Panels: Sagging and warping
    2. Grid System: Rusting and manufacturer's defects
B. Warranty Period Standard:
    1. Acoustical panels: One (1) year from date of substantial completion.
    2. Cirrus Acoustical panels: Ten (10) year from date of substantial completion. Note Space Enclosure requirements
    3. Grid: Ten years from date of substantial completion.
C. Warranty Period HumiGuard:
    1. Acoustical panels: Ten (10) years from date of substantial completion.

2. Grid: Ten (10) years from date of substantial completion.
3. Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is fifteen (15) years from date of substantial completion.

D. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.9 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

Part 2-PRODUCTS

2.1 MANUFACTURERS

A. Ceiling Panels:

1. Armstrong World Industries, Inc. Ultima Beveled Tegular

2.2.1 SUSPENSION SYSTEMS

A. Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized (galvanized steel, aluminum, or stainless steel) as per ASTM A 653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel (aluminum or stainless steel) in baked polyester paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).
1. Structural Classification: ASTM C 635 Intermediate Duty.
2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
3. Acceptable Product: Prelude Concealed Tee as manufactured by Armstrong World Industries, Inc.

B. High Humidity Finish: Comply with ASTM C 635 requirements for Coating Classification for Severe Environment Performance where high humidity finishes are indicated.
1. SS Prelude Plus by Armstrong World Industries, Inc. - 100% Type 304 STAINLESS Steel.
2. AL Prelude Plus by Armstrong World Industries, Inc. - all ALUMINUM
3. Prelude Plus XL Fire Guard by Armstrong World Industries, Inc., G-60 Hot dipped galvanized /aluminum capping
4. Structural Classification: ASTM C 635 duty class.
5. Color: [Stainless for SS only][White aluminum] [Clear Anodized Aluminum]

C. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
D. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.
E. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.
F. Accessories

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
    1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

A. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.
B. Suspend main beam from overhead construction with hanger wires spaced 4-0 on center along the length of the main runner. Install hanger wires plumb and straight.
C. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
D. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
E. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this section.

1.2 SUMMARY

A. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.

B. Paint exposed surfaces whether or not colors are designated in "schedules," except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

C. Painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

1. Pre-finished items not to be painted include the following factory-finished components:
   a. Acoustic materials.
   b. Finished mechanical and electrical equipment.
   c. Light fixtures.
   d. Electrical switch gear.
   e. Distribution cabinets.

2. Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:

   Foundation spaces.
   a. Furred areas.
   b. Pipe spaces.
   c. Duct shafts.

3. Finished metal surfaces not to be pointed include:

a. Anodized aluminum.
b. Stainless steel.

4. Operating parts not to be pointed include moving parts of operating equipment such as the following:
   a. Valve and damper operators.
   b. Linkages.
   c. Sensing devices.
   d. Motor and fan shafts.

5. Labels: Do not paint over Underwriter's laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections: The following sections contain requirements that relate to this section:

1. Division 5 Section "Structural Steel" for shop priming structural steel.
2. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
3. Electrical: Painting electrical work is specified in Division 16.

1.3 DEFINITIONS

A. "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.4 SUBMITTALS

A. Product Data: Manufacturer's technical information, label analysis, and application instructions for each material proposed for use.
   1. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.
   2. Submit coating manufacturers recommended film thickness for each substrate.

B. Samples for verification purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate. Define each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen; color; and texture are achieved.

   1. Provide a list of material and application for each coat of each sample. Label each sample as to location and application.
   2. Submit samples on the following substrates for the Architect's review of color and texture only:
      a. Painted Wood: Provide two 12-inch square samples of each color and material on representative sample of wood.
      b. Ferrous Metal: Provide two 4-inch-square samples of flat metal and two

8-inch-long samples of solid metal for each color and finish.

c. Gypsum Board: Provide two 4-inch-square samples of each color and material on hardboard.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect of problems anticipated using the materials specified.

C. Field Samples: On wall surfaces and other exterior and interior components; duplicate finishes of prepared samples. Provide full-coat finish samples on at least 100 square feet of surface until required sheen, color and texture are obtained; simulate finished lighting conditions for review of in-place work.

1. Final acceptance of colors will be from job-applied samples.
2. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted. Apply coatings in this room or surface in accordance with the schedule or as specified. After finishes are accepted, this room or surface will be used for evaluation of coating systems of a similar nature
3. Final acceptance of colors will be from samples applied on the job. A minimum of two samples per color shall be included at no additional cost.

D. Material Quality: Provide the manufacturer's best quality trade sale point material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude equal products of other manufacturers.
2. Federal Specifications establish a minimum quality level for point materials, except where other product identification is used. Provide written certification from the manufacturer that materials provided meet or exceed these criteria.
3. Products that comply with qualitative requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for use when acceptable to the Architect. Furnish material data and manufacturer's certificate of performance to Architect for proposed substitutions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the 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. Product description (generic classification or binder type).
3. Federal Specification number, if applicable.
4. Manufacturer's stock number and dote of manufacture.
5. Contents by volume, for pigment and vehicle constituents.
6. Thinning instructions.
7. Application instructions.
8. 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 degrees 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.

1.7 JOB CONDITIONS

A Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees Fond 90 degrees F.

B. Apply solvent-thinned points only when the temperature of surfaces to be pointed and surrounding air temperatures are between 45 degrees Fond 95 degrees F.

C. Do not apply paint in snow, rain, fog, or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or too damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

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. Benjamin Moore and Company (Moore).
2. Farrell-Calhoun Point, Inc.
3. Pittsburgh Paints (PPG).
4. Porter Points (Porter).
5. Pratt and Lambert (P & l).
6. The Sherwin-Williams Company (SW)

2.2 PAINT MATERIALS, GENERAL

B. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

C. Material Quality: Provide manufacturer's best-quality point material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Point-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer’s proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturers material data and certificates of performance for proposed substitutions.

D.Gypsum wallboard preparation for painting - Sheetrock brand "First Coat" by USG.

2.3 CONCRETE FLOORS

A. Water-based acrylic curing and sealing compound.

1. W.R. Meadows Vocomp-20 Acrylic Curing and Sealing Compound. Apply at rate of 300 square feet per gallon, in accordance with the manufacturer's recommendations.
2. Seal-Krete Commercial Floor Sealer HS acrylic emulsion polymer. Apply 2 coats to acid-etched / neutralized concrete surface as recommended by the manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of point. Do not begin point application until unsatisfactory conditions have been corrected.

1. Start of pointing will be construed as the Applicators acceptance of surfaces and conditions within a particular area.

3.2 PREPARATION

A. General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be pointed, or provide surface-applied protection prior to surface preparation and

painting. Remove these items if necessary for complete pointing of the items and adjacent surfaces. Following completion of pointing operations in each space or area, have items reinstalled by workers skilled in the trades involved.

1. Clean surfaces before applying point or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and pointing so that dust and other contaminants from the cleaning process will not fall on wet, newly pointed surfaces.

B. Surface Preparation: Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and re-prime. Notify Architect in writing of problems anticipated with using the specified finish-coat material with substrates primed by others.
2. Gypsum drywall surfaces to be painted: treat with surface treatment to equalize porosity and surface texture of joint treatment and paper face of wallboard, and to minimize "telegraphing" or "banding" at the joints in the wallboard.
3. Cementitious Materials: Prepare concrete, concrete masonry block, 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.
   a. Use abrasive blast-cleaning methods as recommended by the paint manufacturer.
   b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

4. 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.
   a. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   b. Prime, stain, or seal wood to be painted. Allow all wood to products to acclimate to the environmental conditions where they will finally be installed prior to finishing. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
   c. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

5. Ferrous Metals: Clean non-galvanized 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 recommendations of the Steel Structures Painting Council. .
   a. Blast steel surfaces clean as recommended by the paint system

manufacturer and in accordance with requirements of SSPC specification SSPC-SP 10.

b. Treat bore and sandblasted or pickled clean metal with a metal treatment wash coat before priming.

c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the point manufacturer, and touch up with the some primer as the shop coat.

6. Galvanized Surfaces: Clean galvanized surfaces with non- petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods. Pre-treat non-galvagrip metal with galvagrip acid and rinse process.

C. Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer's directions.

1. Maintain containers used in mixing and application of 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. Remove film and, if necessary, strain material before using.
3. Use only thinners approved by the paint manufacturer, and only within recommended limits.

D. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where 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. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Paint finish on interior wood doors shall be spray-applied. Brushing or rolling paint on wood doors is not acceptable.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable point film.

1. Paint, surface treatments, and finishes are indicated in "schedules." (Color schedule provided by Architect.)
2. Provide finish coats that are compatible with primers used.
3. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.
4. Apply additional coats when undercoats, stains, or other conditions show

through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.

5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures and similar components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.
6. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
9. Finish interior of wall and base cabinets and similar field- finished casework to match exterior.
10. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
11. Sand lightly between each succeeding enamel or varnish coat.
12. Primer may be omitted on shop-primed metal surfaces that are not exposed to the weather and touch-up paint. Field prime over shop primer steel that is exposed to the exterior / weather.

D. 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. Allow sufficient time between successive coats to permit proper drying. Do not re-coat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

E. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.

F. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled. Inspect behind work and touch up as required to insure that all voids are filled. Apply a second coat if necessary to fill all CMU block pores and pin-holes in filler.

G. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.

H. Pigmented (Opaque) Finishes:. Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

I. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.5 FIELD QUALITY CONTROL

A. The Owner reserves the right to invoke test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied.

1. The Owner will engage the services of on independent testing laboratory to sample the paint material being used. Samples of material delivered to the project will be taken, identified, sealed, and certified in the presence of the Contractor.

3.6 CLEANING

A. Cleanup: At the end of each work day, remove empty cons, rags, rubbish, and other discarded paint materials from the site

B. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between' applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.

1. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
2. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures and similar components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.
3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
4. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
5. Paint bock sides of access panels and removable or hinged covers to match exposed surfaces.

C. Finish interior of wall and base cabinets and similar field- finished casework to match exterior.

1. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
2. Sand lightly between each succeeding enamel or varnish coat.
3. Primer may be omitted on shop-primed metal surfaces that are not exposed to the weather and touch-up paint! primer. Field prime over shop primer steel that is exposed to the exterior / weather.

D. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for pointing as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coats to permit proper drying. Do not re-coat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of

another coat of point does not cause lifting or loss of adhesion of the undercoat.

E. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.

G. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.

H. Pigmented (Opaque) Finishes:. Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

I. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.7 PROTECTION

A. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces

3.8 EXTERIOR PAINT SCHEDULE

A General: Provide the following point systems for the various substrates indicated. Exterior ferrous metals to be field-primed, if steel is shop-primed or unprimed. Prepare unprimed steel in strict accordance with primer manufacturer's recommendations.

B. Ferrous Metal (Type 1):

1. Gloss Acrylic: Two 2-part finish coats over epoxy primer. Three-coat total dry film thickness not less than 11.0 mils.
   a. Primer: SW Macropoxy 646 Fast Cure Epoxy. Minimum dry film thickness - 5.0 mils.
   b. First Coat: SW Acrolon 218 HS Acrylic Polyurethane B65-600 / B65V600. Minimum dry film thickness - 3.0 mils.
   c. Second Coat: SW Acrolon 218 HS Acrylic Polyurethane B65-600 /

B65V600. Minimum dry film thickness - 3.0 mils.

C. Galvanized Metal (Type 2):

1. Flat Acrylic: Two finish coats over primer. Total film thickness not less than 5.1 mils.
   a. Primer: Porter #290 Galvanized Metal Primer. Apply over primed or unprimed galvanized steel.
   b. First Coat: Porter #719 Super Acrylic House Point - flat.
   c. Second Coat: Porter #719 Super Acrylic House Point - flat.

D. Painted Wood Trim (Type 3):

1. Satin Acrylic: Two acrylic coats over latex primer. Total film thickness not less than 5.2 mils.
   a. Primer: Sherwin Williams A-100 Exterior Wood Primer, Alkyd (Y24W20). Dry film thickness not less than 2.3 mils.
   b. First Coat: Sherwin Williams "SuperPaint" A89 Series. Dry film thickness not less than 1.4 mils.
   c. Second Coat: Sherwin Williams "SuperPaint" A89 Series. Dry film thickness not less than 1.4 mils.

F. PVC Piping:

1. Acrylic semi-gloss finish: 1 coat over primer
   a. Primer: Porter #184 "Sta-Kil", not less than 1.5 mils dry film thickness.
   b. Primer: Pittsburgh Paints #17 -21 "Seal Grip", thickness as recommended by manufacturer.
   c. Finish: Porter #649 "Acri-Shield semi-gloss, not less than 1.5 mils dry film thickness.

G. Cast Iron Piping:

1. Acrylic semi-gloss finish: 1 coat over primer
   a. Primer: Porter #272 "Porter Guard" Alkyd Metal Primer, not less than 2.0 mils dry film thickness.
   b. Finish: Porter #649 "Acri-Shield semi-gloss, not less than 1.5 mils dry film thickness.

3.9 INTERIOR PAINT SCHEDULE

A. Ferrous Metal (Type 6):

1. Alkyd satin finish: 2 coats, minimum 3.4 mils over primer.
   a. Porter #296 Gyptex Rust Inhibitive Metal Primer. Apply 2.0 mils DFT over shop primer.
   b. First Coat: Porter #439 Porter Gyptex Eggshell Interior Alkyd Enamel.
   c. Second Coat: Porter #439 Porter Gyptex Eggshell Interior Alkyd Enamel

B. Gypsum Drywall Systems Eggshell Latex: Walls, furr downs, and soffits.

1. Porter:
   a. Primer: #426 Drywall Sealer with Pumice.

b .. Two Finish Coats: #999 "Silken Touch" Eggshell. Dry film thickness: 1 mils - each coat.

2. Farrell-Calhoun:
   a. Primer: #380 "Perfik-Seal" Latex Wall Primer. Dry film thickness 2.0 mils.
   b. Two Finish Coats: #370 Line. Dry film thickness 1.9 mils per coat.

C. Restrooms: Gypsum Drywall Epoxy Wall Paint: Semi-gloss Catalyzed Epoxy. Primer and two finish coats. Dry film thickness not less than 5.4 mils.
   a. Primer: Porter "Blankit" #1129 Acrylic Primer, with a dry film thickness of 1.4 mils.
   b. Finish Coats: Porter #9321 "Dura-Gloze WB" two-component epoxy.

D. Painted Wood Trim /Alkyd semi-gloss.

1. Porter:
   a. Primer: JlPro-Master 2000" Fast Dry Enamel Undercoat, #6064.
   b. Two Finish Coats: "Glyptex" #439 Eggshell Interior Alkyd Enamel. Dry film thickness not less than 1.7 mils - each coat.

2. Farrell-Calhoun:
   a. Primer: #599 Enamel Undercoat. Dry film thickness 2.0 mils.
   b. Two Finish Coats: #500 line Semi-Gloss Alkyd Enamel. Dry film thickness 2.0 mils - each coat.

E. Gypsum Drywall /latex flat: Gypsum Board Ceilings.

1. Porter:
   a. Primer: #426 Drywall Sealer.
   b. Two Finish Coats: #778 Flat latex Ceiling Point. Dry film thickness 1.0 mils - each coat.

2. Farrell-Calhoun:
   a. Primer: #380 "Perfik-Seal"
   b. Two Finish Coats: #400 line Interior Flat latex Wall Point. Dry film thickness 1.6 mils - each coat.

END OF SECTION

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of wood finishes on the following substrates:

1. Exterior Substrates:

a. Exposed glue-laminated beams and columns.
b. Exposed dimension lumber (rough carpentry).
c. Dressed lumber (finish carpentry).

2. Interior Substrates:

a. Exposed glue-laminated beams and columns.
b. Exposed dimension lumber (rough carpentry).
c. Dressed lumber (finish carpentry).

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each finish and for each color and texture required.

C. Product List: Printout of MPI's current "MPI Approved Products List" for each product category specified in Part 2, with the product proposed for use highlighted.

1.3 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in its "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and finish systems indicated.

B. Mockups: Apply benchmark samples of each finish system indicated and each color selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.

a. Vertical and Horizontal Surfaces: Provide samples of at least 1 sq. ft.
b. Other Items: Architect will designate items or areas required.

2. Final approval of stain color selections will be based on benchmark samples.

a. If preliminary stain color selections are not approved, apply additional benchmark samples of additional stain colors selected by Architect at no added cost to Owner.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each finish system that are 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 finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.

B. VOC Content of Field-Applied Interior Primers, Stains, and Transparent Finishes: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to primers, stains, and transparent finishes that are applied in a fabrication or finishing shop:
1. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
2. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
3. Stains: VOC not more than 250 g/L.

C. Stain Colors: As selected by Architect from manufacturer's full range.

2.2 PRIMERS AND SEALERS

A. Wood Preservative: MPI #37.

1. VOC Content: E Range of E1.

2.3 STAINS

A. Exterior Semitransparent Stain (Solvent Based): MPI #13.

1. VOC Content: E Range of E1.

B. Interior Wood Stain (Semitransparent): MPI #90.

1. VOC Content: E Range of E1.

2.4 POLYURETHANE FINISHES

A. Two-Component Aliphatic Polyurethane (Clear): MPI #78.

1. VOC Content: E Range of E1.

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 work.

1. Maximum Moisture Content of Wood Substrates: 15 percent when measured with an electronic moisture meter.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes.
3. Begin finish application only after unsatisfactory conditions have been corrected and surfaces are dry.
4. Beginning application of finish system constitutes Contractor's acceptance of substrate and conditions.

3.2 PREPARATION AND APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.

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.

3.3 EXTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Exposed Glue-Laminated Beam and Column Substrates:

1. Clear, Two-Component Polyurethane Over Stain System: MPI EXT 6.1E.

a. Stain Coat: Exterior semitransparent stain (solvent based).
b. Two Finish Coats: Two-component aliphatic polyurethane (clear).

B. Exposed Rough Carpentry Substrates:

1. Semitransparent Stain System: MPI EXT 6.2L.

a. Two Stain Coats: Exterior semitransparent stain (solvent based).

2. Clear, Two-Component Polyurethane System: MPI EXT 6.2H.

a. Three Finish Coats: Two-component aliphatic polyurethane (clear).

3.4 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Exposed Glue-Laminated Beam and Column Substrates:

1. Polyurethane Varnish Over Stain System: MPI INT 6.1J.

a. Stain Coat: Interior wood stain (semitransparent).
b. Two Finish Coats: Interior, oil-modified, clear urethane (satin).

B. Exposed Rough Carpentry Substrates:

1. Polyurethane Varnish Over Stain System: MPI INT 6.2J.

a. Stain Coat: Interior wood stain (semitransparent).
b. Two Finish Coats: Interior, oil-modified, clear urethane (satin).

C. Finish Carpentry Substrates:

1. Polyurethane Varnish Over Stain System: MPI INT 6.3E.

a. Stain Coat: Interior wood stain (semitransparent).
b. Two Finish Coats: Interior, oil-modified, clear urethane (satin).

END OF SECTION 099300

SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Plaques.
2. Dimensional characters.

1.2 DEFINITIONS

A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for signs.

1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.

C. Samples: For each sign type and for each color and texture required.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

B. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications.

2.2 PLAQUES

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:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. Advance Corporation; Braille-Tac Division.
2. A. R. K. Ramos.
3. Gemini Incorporated.
4. Matthews International Corporation; Bronze Division.
5. Metal Arts; Div. of L&H Mfg. Co.
6. Mills Manufacturing Company.
7. Nelson-Harkins Industries.
8. Southwell Company (The).

2.3 DIMENSIONAL CHARACTERS

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:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. ACE Sign Systems, Inc.
2. Advance Corporation; Braille-Tac Division.
3. Bunting Graphics, Inc.
4. Charleston Industries, Inc.
5. Gemini Incorporated.
6. Grimco, Inc.
7. Innerface Sign Systems, Inc.
8. Mills Manufacturing Company.
9. Mohawk Sign Systems.
10. Nelson-Harkins Industries.
11. Signature Signs, Incorporated.
12. Southwell Company (The).

D. Cutout Characters: Provide characters with square-cut, smooth edges. Comply with the following requirements:

1. Acrylic: 0.25 inch (6.35 mm) thick.

   a. Color: As selected by Architect from manufacturer's full range.
2. Vinyl: Pressure sensitive, 3.5 mils (0.09 mm) thick.

   a. Color: As selected by Architect from manufacturer's full range.
3. Mounting: Projected with concealed noncorroding studs for substrates encountered.

2.4 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.5 FABRICATION

A. General: Provide manufacturer's standard signs of configurations indicated.

1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
3. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.6 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy and background and frame colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.

1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door.

B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
1. Shim Plate Mounting: Provide 1/8-inch- (3-mm-) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.
2. Mechanical Fasteners: Use non-removable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
3. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.

C. Bracket-Mounted Signs: Provide manufacturer's standard brackets, fittings, and hardware for mounting signs that project at right angles from walls and ceilings. Attach brackets and fittings securely to walls and ceilings with concealed fasteners and anchoring devices to comply with manufacturer's written instructions.

D. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.

1. Flush Mounting: Mount characters with backs in contact with wall surface.
2. Projected Mounting: Mount characters at projection distance from wall surface indicated.

END OF SECTION 101400

SECTION 10522 FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division- 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of fire extinguishers, cabinets and accessories is indicated on drawings and as required by local code.

B. Type of products in this section include:

1 . Fire extinguishers.

2. Fire extinguisher cabinets.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain products in this section from one manufacturer.

UL-Listed Products: Provide new portable fire extinguishers which are UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher indicated.

B. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed.

1.4 SUBMITTALS

A. Product Data: Submit product data for each type of product included in this section.

For fire extinguisher cabinets include roughing-in dimensions and details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style and door construction, and panel style and materials.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. FIRE EXTINGUISHER CABINETS

1. Basis-of-Design Product: The design for each product is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

a. Larsen's Manufacturing Co.

i. Extinguisher Type F1 – SS-O-2409 Solid Door, Black Die Cut Vertical Lettering

ii. Extinguisher Type F2 – SS-R-2409-SM

2.2 FIRE EXTINGUISHERS

A. General: Provide fire extinguishers for each extinguisher cabinet and other locations indicated, in specified finishes. Comply with requirements of

governing authorities. Fill and service extinguishers to comply with requirements of governing authorities and manufacturer.

B. Extinguisher Type F1 - Multi-purpose Dry Chemical Type, UL-rated 4A-60B:C, 10 pound nominal capacity, for Class A, Class B, and Class C fires - Larson's MP10.

C. Extinguisher Type F2 - Multi-Purpose Dry Chemical Type, UL-rated 2A-10B:C, 5 pound nominal capacity, for Class A, Class B and Class C fires - Larson's MP5.

2.3 FIRE EXTINGUISHER CABINETS

A. General: Provide fire extinguisher cabinets where indicated, of suitable size for housing fire extinguishers of types and capacities indicated.

B. Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations except as otherwise indicated. Apply finishes in factory after products are assembled. Protect cabinets with plastic or paper covering, prior to shipment.

C. Construction: Manufacturer's standard enameled steel box, with trim, frame, door and hardware to suit cabinet type, trim style, and door style indicated. Weld all joints and grind smooth. Miter and weld perimeter door frames.

PART 3: EXECUTION

3.01 INSPECTION

A. Verify that rough openings for cabinets are correctly sized and located.

3.02 INSTALLATION

A. Install the items of this Section in strict accordance with the original design, approved shop drawings, and requirements of agencies having jurisdiction, as approved by the Architect, anchoring all components firmly into position.

END OF SECTION

SECTION 10800 TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division- 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

A. This Section includes the following:

1. Public-use washroom accessories.
2. Under-lavatory pipe insulation guards.
3. Custodial accessories.

B. Unframed Mirrors: Specified in Section 08800.

1 .3 QUALITY ASSURANCES:

A. Inserts and Anchorage: Furnish inserts and anchoring devices which must be set in concrete or built into wood frame construction; coordinate delivery with other work to avoid delay.

B. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.

C. Products: Provide products of same manufacturer for each type of accessory unit and for units exposed in same areas, unless otherwise acceptable to Architect-

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical date and installation instructions for each toilet accessory.

B. Setting Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices and cut-out requirements in other work.

PART 2- PRODUCTS

2.1 ACCEPTABLE MANUFACTUERS:

A. The brand name and model indicated are the basis of design.

Other brands may be incorporated, provided they are equal to the products indicated and acceptable to the architect.

2.2 MATERIALS, GENERAL:

A. Stainless Steel: AISI Type 302/304/ with polished No.4 finish, 22 gauge (.034 inch) minimum, unless otherwise indicated.

B. Sheet Steel: Cold rolled, commercial quality ASTM A 366, 20-gauge (.040 inch) minimum, unless otherwise indicated. Surface preparation and metal pretreatment as required for applied finish.

C. Galvanized Steel Sheet: ASTM A 527, G60.

D. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456/ Type SC 2.

E. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit or of galvanized steel where concealed.

2.3 FABRICATION

A. General: Only an unobtrusive stamped logo of manufacturer, as approved by Architect, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by means of either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.

B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.

2.4 LAVATORY PIPE INSULATION

A. Insulation for supply lines, P-traps, and drain lines under accessible lavatories in the Toilet Rooms shall be equal to “Lav Guard” under-sink protective pipe covers as manufactured by Trubro, inc. color: white

B. Under-sink pipe insulation at accessible lavatories shall by UL classified, and meet the requirements of the ADAAG 4.19.4, and Florida Accessibility Requirements.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install toilet accessory units in accordance with manufacturers' instructions, using fasteners that are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations indicated.

3.2 UNDER-SINK PIPE INSULATION

A. Coordinate under-sink pipe covers and accessories with plumbing provisions. Provide and install trap covers, tailpiece covers, waste arm covers, supply tube covers, cut-off valve covers, and wheelchair offset at strainer, as required.

B. Install per the manufacturer's recommendations. Secure pipe cover with reusable snap-clips. Provide angle stop “Lock-lid" access cover at supply cut-off valves.

3.3 ADJUSTING AND CLEANING:

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish all exposed surfaces after removing temporary labels protective coatings.

C. Manufacturer's service and parts manual shall be provided to building owner/manager upon completion of project.

3.4 TOILET ACCESSORIES SCHEDULE

A. TA-1: PARTITION-MOUNTED TOILET SEAT COVER DISPENSER, SANITARY NAPKIN DISPOSAL, AND TOILET TISSUE DISPENSER

1. Recessed toilet-seat-cover dispenser, sanitary napkin disposal, and toilet tissue dispenser shall be type-304 stainless steel with all welded construction. Exposed surfaces shall have satin finish. Toilet tissue dispensers shall be ABS plastic with a type-304 stainless steel waste deflector attached to the top tissue dispenser. Unit shall mount flush against side wall of barrier-free toilet compartment to allow clearance for grab bar across front of unit. Door shall be one piece, seamless construction; secured to cabinet with full-length, stainless steel piano hinge and be equipped with a concealed tumbler lock keyed like other Bobrick washroom accessories. Toilet-seat cover dispenser shall fill from below the internal shelf and hold 500 paper covers. Self-closing disposal panel shall be secured to door with a spring-loaded, full length piano hinge, has hemmed edges and equipped with an international graphic symbol identifying napkin disposal. Sanitary napkin disposal shall be furnished with a removable, leak-proof, molded polyethylene receptacle with a capacity of 0.8 gallon. Unit shall be equipped with two theft-

resistant, high impact polystyrene toilet tissue spindles that hold standard core-rolls up to a 5 ¼ inches in diameter. Spindle shall have a concealed locking mechanism opened with special key furnished.

2. Bobrick #B-3574

B. TA-2: Towel Bar
   1. Bobrick #B-673

C. TA-3: Robe Hook
   1. Bobrick #B-76727

E. TA-5: Grab Bars
   1. Grab bar shall be type-304 stainless steel with satin finish. Grab bar shall have 18-gauge wall thickness and 1-112 inch outside diameter. Clearance between the grab bar and wall shall be 1 - 112 inches. Concealed mounting flanges shall be 1/8-inch thick stainless steel plate, 2 inches by 3- 1 18 inches long, and equipped with two screw holes for attachment to wall. Flange covers shall be 22 gauge, 3-1/4 inch diameter by 1/2 inch deep, and shall snap over mounting flange to conceal mounting screws and/or "Wing-It" fasteners. Ends of grab bar shall pass through concealed mounting flanges and be heliarc welded to form one structural unit. Grab bar shall comply with barrier-free accessibility guidelines for structural strength.
   2. Bobrick #B-6806 Series; configuration as indicated.

F. STAINLESS STEEL MIRROR
   1. Mirror shall have one-piece, polished stainless steel 1/2" x 112" x 1/2" channel frame. Mirror frame shall have 90-degree uniform comers; open or uneven mitered comers are not acceptable. Mirror shall be No.1 quality, 1/4-inch (6mm) float/plate glass. All mirror edges shall be protected by filler strips. Mirror back shall be protected by full-size shock-absorbing, water-resistant, nonabrasive 1/8-inch (3-mm) thick polyethylene padding. Galvanized steel back with formed edges for additional strength shall have integral hanging brackets for mounting on concealed one-piece rectangular wall hanger{s). Mirror shall be secured to hanger with concealed Phillips head locking setscrews in bottom of frame. Manufacturer's service and ports manual shall be provided to building owner/manager upon completion of project.
   2. Bobrick #B- 1556

G. TA-7: COMBINATION TOWEL DISPENSER/WASTE RECEPTICAL UNITS:
   1. Semi-recessed paper towel dispenser and waste receptical shall be constructed entirely of type-304 stainless steel. Exposed surfaces shall have satin finish. Flange shall be drawn, one piece, seamless beveled construction. Door shall be secured to cabinet with full-length, stainless steel piano hinge and be equipped with a concealed tumbler lock. Rounded towel tray shall be equipped with five-position adapter; adjustable to dispense 600 C-Fold, 800 multifold, or 1,100 single-fold paper towels. Removable stainless steel waste receptacle shall be secured to cabinet by tumbler lock; top and bottom edges shall be hemmed for safe handling. Minimum capacity: 12 gallons.
   2. Bobrick #B-3904; where indicated

I. TA-9 LAVATORY-MOUNTED SOAP DISPENSER FOR SOAPS AND DETERGENTS

1. Lavatory-mounted soap dispenser shall dispense liquid and lotion soaps. Piston and spout assembly shall be type-304 stainless steel with bright polished finish. Escutcheon shall lock to body with concealed locking mechanism that is opened only with special key provided. Spout shall rotate 360 degrees without damage to valve mechanism. Piston, spout, and supply-tube assemble shall be removable from top for filling and maintenance. Valve shall be equipped with plastic cylinder, stainless steel spring, U-packing seal, and duckbills. Shank shall accommodate mounting thicknesses up to 1 inch. Translucent, shatter-resistant polyethylene container shall have a capacity of 20 fluid ounces.
2. Bobrock #B-2740

END OF SECTION 10800