

# **Palmerton Area School District**

## **S.S. Palmer Elementary School – Security Vestibule & Renovations**

### **VOLUME 2 DIVISIONS 2 through 14 DIVISIONS 31 through 33 TECHNICAL SPECIFICATIONS**

**CRA PROJECT NO. 3378.1**

**FEBRUARY 9, 2024**



**Crabtree, Rohrbaugh & Associates - Architects**  
401 E. Winding Hill Rd. Mechanicsburg, PA, 17055  
717-458-0272 [cra-architects.com](http://cra-architects.com)

Charlottesville, VA • Baltimore, MD • White Sulphur Springs, WV



**VOLUME 2**

TECHNICAL SPECIFICATIONS

FOR

**S.S. Palmer Elementary School –  
Security Vestibule & Renovations**

FOR THE

**PALMERTON AREA SCHOOL DISTRICT  
680 FOURTH STREET  
PALMERTON, PENNSYLVANIA 18071**



**CRABTREE, ROHRBAUGH & ASSOCIATES  
ARCHITECTS**

401 East Winding Hill Road  
Mechanicsburg, Pennsylvania 17055  
Phone (717) 458-0272

ARCHITECT'S PROJECT NO. 3378.1



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## SECTION 024119 - SELECTIVE DEMOLITION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Demolition and removal of selected portions of a building or structure.
  - 2. Salvage of existing items to be reused or recycled.
- B. Related Sections include the following:
  - 1. Division 1 Section "Summary of Work" for use of premises, and phasing, and Owner-occupancy requirements.
  - 2. Division 1 Section "Temporary Facilities & Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities and environmental-protection measures for selective demolition operations.
  - 3. Division 1 Section "Cutting and Patching" for cutting and patching procedures for selective demolition operations.
  - 4. Division 2 Section "Selective Structure Demolition" for demolition and removal of selected portions of buildings, structures and site elements.
  - 5. Divisions 21 through 28 for demolishing, cutting, patching, or relocating mechanical and electrical items.

#### 1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to the Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

#### 1.4 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the Owner that may be encountered during selective demolition remain the Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the Owner.
  - 1. Before demolition and throughout construction, all Prime Contractors shall be responsible to review with the Owner's, all items being removed by their trades. All items designated during this review to remain the Owner's property, shall be maintained in good condition and turned over to the Owner.

#### 1.5 SUBMITTALS

- A. Qualification Data: For Contractor.
- B. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Locations of proposed dust and noise-control temporary partitions and means of egress.
  - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
  - 6. Means of protection for items to remain and items in path of waste removal from the building.

Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

- C. Pre-demolition Photographs or Recordings: Show existing conditions of adjoining construction and site improvements, including finish surfaces, which might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.
- D. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

#### 1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that specializes in demolition work similar in material and extent to that indicated for this Project.
- B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

- C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Standards: Comply with ANSI A10.6 and NFPA 241.
- E. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." Review methods and procedures related to selective demolition including, but not limited to, the following:
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  - 5. Review areas where existing construction is to remain and requires protection.

#### 1.7 PROJECT CONDITIONS

- A. The Owner will occupy portions of the building immediately adjacent to the selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
  - 1. Comply with requirements specified in Division 1 Section "Summary of Work."
- B. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner as far as is practical. However, minor variations within the existing structure or site may occur by the Owner's removal and salvage operations prior to the start of demolition work.
  - 1. Prior to selective demolition of each phase or sequence, the Owner will remove all moveable furniture, fixtures and equipment, by construction phase or sequence, which may otherwise interfere with demolition or construction activities.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Architect and Owner. The Owner will remove the hazardous materials under a separate contract, or request a proposal to remove the hazardous materials.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.
- F. All Contractors shall be responsible for verification of all existing building dimensions and conditions, including finishes and materials, systems shown and designated as existing on the Contract Drawings prior to starting demolition and construction. Any discrepancies in information indicated on the Contract drawings shall be directed in writing to the attention of the Architect prior to the start of demolition and construction. Verification of clearances required for all new equipment, piping, ductwork and related components shall be the Contractor's responsibility.
  - G. All Contractors shall patch, repair or replace all existing finishes and materials disturbed or damaged during demolition. All repair or replacement shall match adjacent existing and/or new finishes and materials as indicated.
  - H. See Architectural, Structural, Mechanical, Electrical and Plumbing drawings for demolition work required. Coordinate all Work by other Contractors, including, but not limited to, capping and disconnection of building services.
  - I. Existing conditions as appear in these Contract Documents may vary with actual conditions because of undocumented work performed by Owner's staff and by other contractors.
  - J. All Contractors shall be responsible for verification of all demolition conditions related to accepted Alternate bids, including finishes and materials, systems shown and designated as existing or new on the Contract Drawings prior to starting of demolition and construction. Any discrepancies in information indicated on the Contract Drawings shall be directed in writing to the attention of Architect prior to starting demolition and construction.
- 1.8 WARRANTY
- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine the extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

- D. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.
- E. If cause deems necessity, engage a professional engineer to survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs, or preconstruction videotapes.
  - 1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproductions.
- G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

### 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
  - 1. Comply with requirements for existing services/systems interruptions specified in Division 1 Section "Summary of Work."
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. The Owner will arrange to shut off indicated services/systems when requested by the Contractor. The Contractor may make these arrangements if approved by the Owner.
  - 2. Arrange to shut off indicated utilities with utility companies.
  - 3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition, provide temporary services/systems that bypass the area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
    - a. Where an entire wall is to be removed, existing services/systems may be removed with removal of the wall.

### 3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities & Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  - 2. Provide temporary weather protection, during interval between selective `demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities & Controls."
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  - 1. Strengthen or add new supports when required during progress of selective demolition.

### 3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
  - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of



- hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
  6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  9. Dispose of demolished items and materials promptly.
- B. Reuse of Building Elements: Do not demolish building elements beyond what is indicated in the Contract Documents without Architect's approval.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
  2. Pack or crate items after cleaning. Identify contents of containers.
  3. Store items in a secure area until delivery to Owner.
  4. Transport items to Owner's storage area on-site.
  5. Protect items from damage during storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
  2. Pack or crate items after cleaning and repairing. Identify contents of containers.
  3. Protect items from damage during storage.
  4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.
- 3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS
- A. Concrete: Demolish in small sections. Cut concrete at junctures with construction to remain, using power-driven saw. Neatly trim openings to dimensions indicated.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
  - 1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.
    - a. In lieu of providing extensive labor, materials and equipment to remove all residual, affixed adhesives in preparation for new flooring, the Contractor may install specified self-leveling underlayment over the existing subfloor, to a level and finish that provides an acceptable substrate to accommodate the new finish floor system, if the Contractor so chooses.
- E. Roofing: Remove no more existing roofing than can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Refer to Division 7 Sections for new roofing requirements.
  - 1. Remove existing roof membrane, flashings, copings, and roof accessories as indicated in the demolition and renovation notes.
- F. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.
- G. Refer to the drawings for additional demolition work if any for each room or building component.
- H. Prepare existing remaining substrates to receive new finishes as indicated on the finish schedule. Preparation of substrates shall be in conformance with the installation requirements of each new finish.

### 3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
  - 1. Do not allow demolished materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119



## SECTION 033000 - CAST-IN-PLACE CONCRETE

### 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 specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.
- B. Cast-in Place concrete includes, but is not limited to, the following:
  - 1. Footings and foundation walls.
  - 2. Interior slabs-on-grade.
  - 3. Masonry infill.
- C. Related Sections include the following:
- D.
  - 1. Division 5 "Structural Steel" for embedded items.
  - 2. Division 5 "Metal Fabrications" for embedded items.
  - 3. Division 9 Sections, including, but not limited to, Resilient Tile Flooring and Carpet Tile.
  - 4. Division 31 Section "Earth Moving" for drainage fill under slabs-on grade.
  - 5. Division 32 Section "Concrete Paving" for concrete intended for exterior sidewalks, pads, plazas and curbs.

#### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. If mix water is to be withheld at the plant and later added at Project site to provide the water-to-cement ratio of the design mix, this must be clearly indicated on every delivery ticket to the Project site...NO EXCEPTIONS!

- C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement". Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement.
- D. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
  - 1. Cementitious materials and aggregates.
  - 2. Steel reinforcement and reinforcement accessories.
  - 3. Polypropylene Fiber Reinforcement.
  - 4. Admixtures.
  - 5. Curing materials.
  - 6. Floor and slab treatments, when required by Architectural Drawings.
  - 7. Vapor barriers.
  - 8. Semi-rigid joint filler.
  - 9. Premolded expansion joint-filler strips.
  - 10. Repair materials, when required for repair and use of the repair is accepted by the Architect.
  - 11. Epoxy for drilling and placing dowels into hardened concrete.
  - 12. Waterstops.
- E. Samples: 12-inch-square samples of each type of vapor barrier required.
- F. Minutes of pre-installation conference.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete Work 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. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
  - 1. Manufacturer must use Pennsylvania Department of Transportation certified materials.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
  - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel".
- F. ACI Publications: Comply with the following, unless more stringent provisions are indicated:

1. ACI 301, "Specification for Structural Concrete."
  2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
  3. CRSI Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
  4. ACI 306.1 "Standard Specification for Cold Weather Concreting."
  5. ACI 305 "Hot Weather Concreting."
- G. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
1. Before submitting design mixes, review concrete mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixes.
    - c. Ready-mix concrete producer.
    - d. Concrete subcontractor.
  2. The Contractor's superintendent must have a pre-installation meeting prior to placing any building slab concrete with a representative from the fiber manufacturer, listed in Paragraph 2.6 of this Section, to obtain technical assistance, guidance, and recommendations for mix designs and finishing practices for a fiber free finished top surface. In addition to any recommendations given by the fiber manufacturer the Contractor shall follow the requirements of Paragraph 3.10, C, "Requirements for finishing slabs with fiber reinforcement."

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage. Store reinforcement in a manner that prevents soil, mud, debris, or oil from adhering to the bars. If for any reason soil, mud, debris, oil is on a bar it will be removed before the bar is installed.

## PART 2 - PRODUCTS

### 2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Plywood, metal, or other approved panel materials.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

- E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the exposed concrete surface.
  - 2. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in concrete surface.
  - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
- F. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

## 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

## 2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
  - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.
- B. Joint Dowel Bars: Plain-steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

## 2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
  - 1. Fly Ash: Fly ash may be part of the concrete mix as follows. Fly ash to be in accordance with ASTM C 618, Class C or F. Use only in concrete mixes for foundation footings, CMU wall grout fills and slabs on grade.
  - 2. Ground Granulated Blast-Furnace Slag: Use one brand of cement throughout project unless approved otherwise by Architect.
- B. Normal-Weight Aggregate: ASTM C 33, uniformly graded; nominal maximum aggregate size of 1 inch (3/4 inch where placement by pumping).
- C. Water: Potable and complying with ASTM C 94.



## 2.5 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.
- B. Air-Entraining Admixture: ASTM C 260; certified by manufacturer to be compatible with other admixtures.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
  - 1. Products: Subject to compliance with requirements, products to include, but are not limited to, the following:
    - a. Eucon WR-75; Euclid Chemical Co.
    - b. Chemtard; ChemMasters Corp.
    - c. Plastocrete 161; Sika Corp.
- D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
  - 1. Products: Subject to compliance with requirements, products to include, but are not limited to, the following:
    - a. Super P; Anti-Hydro Co., Inc.
    - b. Eucon 37; Euclid Chemical Co.
    - c. Superslump; Metalcrete Industries.
- E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
  - 1. Products: Subject to compliance with requirements, products to include, but are not limited to, the following:
    - a. Accelguard 80; Euclid Chemical Co.
    - b. Accel-Set; Metalcrete Industries.
    - c. Daraset; W.R. Grace & Co.
- F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
  - 1. Products: Subject to compliance with requirements, products to include, but are not limited to, the following:
    - a. Eucon Retarder 75; Euclid Chemical Co.
    - b. Daratard-17; W. R. Grace & Co.
    - c. Plastiment; Sika Corporation.
- G. Moisture Vapor Reduction Admixture: ASTM C 494, Type S; Concrete Moisture Vapor Reduction Admixture (MVRA): Concrete moisture vapor reduction admixture for all interior slabs on grade shall be a non-toxic, liquid admixture that is specifically designed to have a natural chemical reaction with pre-existing elements inside the concrete to eliminate the route of moisture vapor emission through the slab by restricting the integral capillary system.
  - 1. Basis-of-Design Product: "Barrier One High Performance Concrete Admixture" manufactured by Barrier One, Inc.
  - 2. Provide the above named product or, upon approval of the Architect and/or Structural Engineer, provide a product that meets or exceeds the below project specific

performance requirements at the expense of the concrete moisture vapor reduction admixture (MVRA) manufacturer:

- a. Project-specific quality control process shall include, but not be limited to, the following:
  - 1) Independent procurement of one cylinder per day of placement of concrete containing MVRA; do not proceed without MVRA representative being present.
  - 2) Independent testing of all cylinders for hydraulic conductivity per ASTM D5084.
  - 3) Assessing each cylinder for maximum flow of 6.0 E-08 cm/sec.
  - 4) Should any cylinder exceed the maximum flow, procure a core from that day's placement.
  - 5) Independently test core for hydraulic conductivity per ASTM D5084.
  - 6) Should any core exceed the maximum flow, provide a topical moisture mitigation system for all areas not meeting the stated limit; moisture mitigation system to include all labor, material and warranty that meets or exceeds the terms of the concrete moisture vapor reduction admixture manufacturer's warranty.
- b. Warranty requirements: Said product must be installed according to and in compliance with the manufacturer's published data sheet to include but not limited to dosing instructions, onsite representation requirements, and the use of an ASTM E 1745 vapor retarder, installed following ASTM E 1643 and ASTM F 710 guidelines; suspended concrete slabs do not require a vapor retarder.
  - 1) MVRA manufacturer's warranty shall include:
    - a) Term: Life of the concrete.
    - b) Repair and/or removal of failed flooring.
    - c) Placement of a topical moisture remediation system.
    - d) Replacement of flooring materials like original installed to include material and labor.
  - 2) MVRA Manufacturer shall provide an adhesion warranty to match the term of the adhesive manufacturer's warranty in accordance with the MVRA manufacturer's requirements for conveyance of such.

## 2.6 POLYPROPYLENE FIBER REINFORCEMENT

- A. Synthetic Fiber: Fibrillated or monofilament polypropylene fibers engineered and designed for use in concrete, complying with ASTM C1116, Type III, 1/2 to 2-1/4 inches long. The fibers shall be placed in the concrete at the mixing plant.
  1. Abcpolymer concrete fibers, FIBRIL-TUF
- B. Available Products: Subject to compliance, provide one of the following to REPLACE welded wire fabric reinforcement in concrete slabs-on-grade:
  1. Grace Strux 90/40; W.R. Grace & Company, Construction Products Division.

2. Novemesh 950; SI Concrete Systems.
3. Forta Ferro; Forta Corporation.

## 2.7 VAPOR BARRIER AND GRANULAR MATERIALS

- A. Vapor Barrier: ASTM E 1745, Class A, membrane that satisfies the following:
  1. Membrane shall not be less than 15 mils thick.
  2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Stego Wrap 15-mil Class A Vapor Barrier; Stego Industries, LLC;
    - b. VB-350 16 mil Class A Vapor Retarder; Barrier-Bac, Inc.
    - c. Sealtight Perminator 15 mil Class A Vapor Retarder; W. R. Meadows, Inc.
    - d. Viper VaporCheck 16 mil Class A Vapor Barrier; Insulation Solutions, Inc.
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel. Abcpolymer concrete Fibers, FIBRIL-TUF shall be added to the list of acceptable manufacturers of POLYPROPYLENE FIBER REINFORCEMENT.

## 2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Solvent-Borne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- I. Products: Subject to compliance with requirements, products to include, but are not limited to, the following:
  1. Evaporation Retarder:
    - a. Cimfilm; Axim Concrete Technologies.
    - b. Finishing Aid Concentrate; Burke Group, LLC (The).
    - c. Spray-Film; ChemMasters.
    - d. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
    - e. Sure Film; Dayton Superior Corporation.
    - f. Eucobar; Euclid Chemical Co.
    - g. Vapor Aid; Kaufman Products, Inc.

- h. Lambco Skin; Lambert Corporation.
  - i. E-Con; L&M Construction Chemicals, Inc.
  - j. Confilm; Master Builders, Inc.
  - k. Waterhold; Metalcrete Industries.
  - l. SikaFilm; Sika Corporation.
  - m. Finishing Aid; Symons Corporation.
  - n. Certi-Vex EnvioAssist; Vexcon Chemicals, Inc.
2. Clear, Solvent-Borne, Membrane-Forming Curing Compound:
- a. AH Clear Cure; Anti-Hydro International, Inc.
  - b. Spartan-Cote; Burke Group, LLC (The).
  - c. Spray-Cure & Seal 15; ChemMasters.
  - d. Conspec #1-15 percent solids; Conspec Marketing & Manufacturing Co., Inc.
  - e. Day-Chem Cure and Seal; Dayton Superior Corporation.
  - f. Diamond Clear; Euclid Chemical Co.
  - g. Nitocure S; Fosroc.
  - h. Lambco 120; Lambert Corporation.
  - i. L&M Dress & Seal 18; L&M Construction Chemicals, Inc.
  - j. CS-309; W. R. Meadows, Inc.
  - k. Seal N Kure; Metalcrete Industries.
  - l. Rich Seal 14 percent UV; Richmond Screw Anchor Co.
  - m. Kure-N-Seal; Sonneborn, Div. of ChemRex, Inc.
  - n. Flortec 14; Sternson Group.
  - o. Cure & Seal 14 percent; Symons Corporation.
  - p. Clear Seal 150; Tamms Industries Co., Div. of LaPorte Construction Chemicals of North America, Inc.
  - q. Acrylic Cure; Unitex.
  - r. Certi-Vex AC 309; Vexcon Chemicals, Inc.
3. Clear, Waterborne, Membrane-Forming Curing Compound:
- a. AH Clear Cure WB; Anti-Hydro International, Inc.
  - b. Klear Kote WB II Regular; Burke Chemicals.
  - c. Safe-Cure & Seal 20; ChemMasters.
  - d. High Seal; Conspec Marketing & Manufacturing Co., Inc.
  - e. Safe Cure and Seal; Dayton Superior Corporation.
  - f. Aqua Cure VOX; Euclid Chemical Co.
  - g. Cure & Seal 309 Emulsion; Kaufman Products Inc.
  - h. Glazecote Sealer-20; Lambert Corporation.
  - i. Dress & Seal WB; L&M Construction Chemicals, Inc.
  - j. Vocomp-20; W. R. Meadows, Inc.
  - k. Metcure; Metalcrete Industries.
  - l. Cure & Seal 150E; Nox-Crete Products Group, Kinsman Corporation.
  - m. Rich Seal 14 percent E; Richmond Screw Anchor Co.
  - n. Kure-N-Seal WB; Sonneborn, Div. of ChemRex, Inc.
  - o. Florseal W.B.; Sternson Group.
  - p. Cure & Seal 14 percent E; Symons Corporation.
  - q. Seal Cure WB 150; Tamms Industries Co., Div. of LaPorte Construction Chemicals of North America, Inc.

- r. Hydro Seal; Unitex.
  - s. Starseal 309; Vexcon Chemicals, Inc.
4. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound:
- a. Spray-Cure & Seal Plus; ChemMasters.
  - b. UV Super Seal; Lambert Corporation.
  - c. Lumiseal Plus; L&M Construction Chemicals, Inc.
  - d. CS-309/30; W. R. Meadows, Inc.
  - e. Seal N Kure 30; Metalcrete Industries.
  - f. Rich Seal 31 percent UV; Richmond Screw Anchor Co.
  - g. Cure & Seal 31 percent UV; Symons Corporation.
  - h. Certi-Vex AC 1315; Vexcon Chemicals, Inc.
5. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound:
- a. Klear-Kote Cure-Sealer-Hardener, 30 percent solids; Burke Group, LLC (The).
  - b. Polyseal WB; ChemMasters.
  - c. UV Safe Seal; Lambert Corporation.
  - d. Lumiseal WB Plus; L&M Construction Chemicals, Inc.
  - e. Vocomp-30; W. R. Meadows, Inc.
  - f. Metcure 30; Metalcrete Industries.
  - g. Vexcon Starseal 1315; Vexcon Chemicals, Inc.

## 2.9 RELATED MATERIALS

- A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Semi-rigid Joint Filler: Two-component, semi-rigid. 100 percent solids per ASTM D 2240.
- C. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
  - 1. Type: Class IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- D. Reglets: Fabricate reglets of not less than 0.0217-inch-thick galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- E. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
- F. Waterstops: Flexible PVC waterstops for embedding in concrete to prevent passage of fluids through joints. Factory-fabricate corners, intersections, and directional changes. Use profile of ribbed surface with center bulb. The waterstop is to be embedded 3 inches into concrete unless noted otherwise on Drawings.

## 2.10 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
  - 4. Compressive Strength: Not less than 4,100 psi at 28 days when tested according to ASTM C 109.
  - 5. Repair Topping: Traffic-bearing, cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch.
    - a. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
    - b. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
    - c. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch, or coarse sand, as recommended by topping manufacturer.
    - d. Compressive Strength: Not less than 5,700 psi at 28 days when tested according to ASTM C 109.

#### 2.11 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:
  - 1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301 and ACI 318-02.
  - 2. Under circumstances where laboratory trial mix or field test data are not available, the required average compressive strength of concrete produced with materials similar to those specified shall be at least 1,200 psi greater than the specified compressive strength. This alternative shall not be permitted if the specified compressive strength is greater than 4,000 psi.
- B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.
- C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
  - 1. Fly Ash: 18 percent.
  - 2. Ground Granulated Blast-Furnace Slag: 50 percent.
- D. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5 percent, unless otherwise indicated:
  - 1. Air Content: 6 percent for 3/4-inch nominal maximum aggregate size.

- E. Do not air entrain concrete to trowel-finished interior floors and suspended slabs. Do not allow entrapped air content to exceed 3 percent.
- F. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- G. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
  - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

## 2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings and Foundation/Retaining Walls: Proportion normal-weight concrete mix as follows:
  - 1. Minimum Compressive Strength (28 Days): 3,000 psi.
  - 2. Select slump limits from subparagraphs below or revise to suit Project.
  - 3. Maximum Slump: 4 inches.
  - 4. Maximum Slump for Concrete Containing High-Range Water-Reducing Admixture: 8 inches after admixture is added to concrete with 2- to 4-inch slump.
- B. Interior Slab-on-Grade: Proportion normal-weight concrete mix as follows:
  - 1. Minimum Compressive Strength (28 Days): 3,500 psi.
  - 2. Select cementitious materials content from subparagraphs below or delete if ACI 301 default for floors is sufficient. ACI 302.1R recommends quantities in listed order below, for nominal maximum aggregate sizes 1-1/2, 1, and 3/4 inch (38, 25, and 19 mm). ACI 301 sets identical quantities, but for minimum cement rather than cementitious materials content.
  - 3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
  - 4. Maximum Slump for Concrete Containing High-Range Water-Reducing Admixture: 8-inches after admixture is added to concrete .
  - 5. Interior slab mix is to contain a high-range, water-reducing admixture with a water cement ratio = 0.47.
  - 6. Produce a mix that has the minimum amount of water necessary to generate a 2 to 3 inch slump prior to the addition of any water reducing admixtures, as recommended in ACI 302.1R, "Concrete Floor and Slab Construction," Chapter 6, "Concrete Properties and Consistency."
  - 7. Reinforce concrete with polypropylene fiber reinforcement at a dosage rate specified by fiber reinforcement manufacturer. Reinforcement to be placed in concrete at the mixing plant per fiber reinforcement manufacturer's recommendations.
  - 8. Per ACI 544.3, mix designs for concrete containing fiber reinforcement shall include a maximum 55% by volume coarse aggregate content by total volume of aggregates (sand and stone).
- C. Exterior Slabs-on-Grade: As indicated in Division 32 Section "Concrete Paving."

## 2.13 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## 2.14 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information for each delivery to the Project site.
  - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
  - 1. Class A, 1/8 inch for concrete exposed to view.
  - 2. Class B, 1/4 inch for all other concrete surfaces.
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
  - 1. Do not use rust-stained steel form-facing material.
- E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- G. Chamfer exterior corners and edges of permanently exposed concrete.
- H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.



- J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor bolts, accurately located, to elevations required.
  - 2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
  - 3. Install dovetail anchor slots in concrete structures as indicated.

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.4 VAPOR BARRIER AND GRANULAR MATERIAL

- A. Vapor Barrier: Place, protect, and repair membrane according to ASTM E 1643, ASTM F 710 and manufacturer's written instructions. Contractor shall place the vapor barrier directly below the concrete slab and on top of granular fill. Lap joints 6 inches minimum and seal with manufacturer's recommended tape. Sheets to extend to interior face of foundation walls, turn up vertically and terminate flush with top of concrete floor slab. Adhere to foundation wall with manufacturer's recommended tape. Seal all penetrations with manufacturer's recommended methods of boots, mastic or tape.
- B. Granular Fill: Place a minimum of 4 inches compacted granular fill on top of subgrade to elevation tolerances of plus 0 inch or minus 1/2 inch.

### 3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
  - 1. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in longest practicable lengths on bar supports spaced at 3 feet o.c. maximum spacing to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

### 3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1 1/2 inches into concrete.
  - 3. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  - 4. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  - 5. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to form panels of patterns as shown. Use saw cuts or inserts.
  - 1. Grooved Joints Using Inserts: Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. After concrete has cured, remove inserts and clean groove of loose debris.
  - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints to a depth of one-third the slab thickness. Cut into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
  - 3. Clean all debris from joints.

- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
  - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
  - 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.
  - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
  - 4. For exterior concrete paving joints, refer to Division 32 Section "Concrete Paving Joint Sealants."
- E. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated.
  - 1. Use dowel sleeves or lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

### 3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Before placing concrete, water may not be added at Project site, unless there is a specific written indication on the delivery slip of how much water has not been added to the mix at the mixing plant.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mix. The addition of fiber reinforcement to concrete for slab construction will reduce field tested concrete slumps. The lower slump values for concrete that contain fiber reinforcement will not reduce workability of the concrete. Per ACI 302, the workability of a concrete mixture is not directly proportional to the slump. The addition of water at the Project site to increase slump will likely result in excessive bleed water during finishing operations and is not permitted. Contractor shall contact fiber reinforcement representative to address any concerns with concrete workability and field-tested slumps.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.
  - 1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
  - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to

consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.

- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  2. Maintain reinforcement in position on chairs during concrete placement.
  3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  4. Slope surfaces uniformly to drains where required.
  5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
  2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- F. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
  3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.

1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
  2. Do not apply rubbed finish to smooth-formed finish.
- C. Rubbed Finish: Apply the following to smooth-formed finished concrete:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
  2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

### 3.9 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field-fabricate joints in waterstops according to manufacturer's written instructions.

### 3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Concrete placement conditions should satisfy the following requirements to reduce random slab cracking:
1. The base shall be free of frost and should not contain standing water. If concrete is placed in hot, dry conditions, the base should be lightly damped with water in advance of concreting.
  2. When slabs are placed on grade, there should be no more than 30 deg F difference between the temperature of the base and concrete at the time of placement.
  3. Ideally, concrete should be protected from sun and wind and be placed after floor or roof deck is installed.
- C. Requirements for finishing slabs with fiber reinforcement.
1. The use of vibratory screeds per standard ACI recommendations is required.

2. Consult fiber manufacturer representative if bleed water appears during finishing operations. Removing bleed water by any means other than natural evaporation will likely expose fibers in the finished surface.
  3. Conduct power trowel operations as late as possible per standard ACI recommendations.
- D. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.
1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, Portland cement terrazzo, and other bonded cementitious floor finishes.
- E. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- F. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system
  2. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155 for a randomly trafficked floor surface:
    - a. Specified overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness, F(L) 17; for slabs-on-grade.
    - b. Specified values of flatness shall be based on "10-ft straightedge method" for suspended slabs. Flatness shall be within 1/8-inch per 10-ft for four of five consecutive measurements. In addition, visually obvious faults in floor flatness shall be corrected at contractor's own expense.
- G. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- H. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### 3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

### 3.12 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods for unformed surfaces.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:
  - 1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with plastic sheet cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches. Cure for not less than 24 hours.
    - a. Cure concrete surfaces to receive floor coverings with a plastic sheet cover for 24 hours or a curing compound that the manufacturer recommends for use with floor coverings.
  - 2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - 3. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial

application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid epoxy joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Fill joint in a manner that provides a finish at the joint which is flush with the surrounding surface of the slab.
- D. Joint filling is not required for 1/8-inch-wide control joints.

### 3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  - 2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  - 1. Repair finished surfaces containing defects. Surface defects include spalls, pop-outs, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that



penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks less than 0.01 inch wide and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks less than 0.01 inch wide and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar. All removal and repairs shall be at Contractor's own expense.

F. Repair materials and installation not specified above may be used, subject to Architect's approval. All removal and repairs shall be at Contractor's own expense.

### 3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner shall engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article. See Paragraph 2.5, G, 2 for performance requirements at the expense of the concrete moisture vapor reduction admixture (MVRA) manufacturer (ALTERNATE BID).

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 30 cu. yd. or fraction thereof.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
  4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
  5. Compression Test Specimens:
    - a. ASTM C 31; cast and laboratory (standard) cure one set of three standard cylinder specimens for each composite sample. Transport the cylinders to laboratory within 24 hours for final curing and testing.
    - b. ASTM C 31; cast and field cure one standard cylinder specimens for each composite sample. Field-cure the cylinders for the first 5 days, minimum, in the field under the same conditions as the cast concrete. Transport the cylinders to the laboratory for continued curing and testing.
  6. Compressive-Strength Tests:
    - a. ASTM C 39; test one laboratory (standard) cured specimen at 7 days and 2 specimens at 28 days.
    - b. ASTM C39; test field cured specimen at 7 days.
- C. When strength of field-cured cylinders is less than 85 percent of companion cylinders that have been totally cured in the laboratory (no field curing), Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- D. A 28 day compressive-strength test for concrete shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- E. Strength of concrete will be satisfactory if every average of sets of three consecutive compressive-strength tests at 28 days (total of 6 cylinders) equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- F. If time of concrete strength gain is affected by materials in the mix, such as fly ash, provide correlation information between the 28-day compressive strength and the final compressive strength prior to performing compressive strength tests.
- G. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- H. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. The Contractor will be notified of the tests and the tests will be paid for by the Contractor. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

END OF SECTION 033000



## SECTION 035420 - CEMENT-BASED UNDERLAYMENT

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings, Division 0 - Bidding and Contract Requirements and Division 1 General Requirements apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes.
  - 1. Cement-based, polymer-modified, self-leveling underlayment for filling, patching, smoothing, and leveling substrates for interior applications – for installation over concrete slabs.
  - 2. The General Contractor is responsible to provide cement-based underlayment for the repair of floors damaged through identified demolition procedures and as needed to level existing floors after demolition procedures.
- B. Related Sections include the following:
  - 1. Division 3 Sections for cast-in-place concrete.
  - 2. Division 9 Sections for Finishes.

#### 1.3 REFERENCES

- A. Definitions:
  - 1. Friable: Substrate material easily crumbled or pulverized.
- B. Referenced Standards:
  - 1. ASM International (ASTM):
    - a. ASTM C109/C109M – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. Cube Specimens).
    - b. ASTM C136/C136M – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
    - c. ASTM C191 – Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle.
    - d. ASTM C348 – Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.

- e. ASTM C1583/C1583M Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).
  - f. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
2. South Coast Air Quality Management District (SCAQMD)
- a. SCAQMD Rule 1113 Architectural Coatings.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
  - 1. Product characteristics.
  - 2. Performance Criteria.
  - 3. Safety Data Sheets (SDS).
- B. Shop Drawings: Plans indicating substrates, locations, and average depths of cement-based underlayment based on survey of substrate conditions.
- C. Manufacturer’s written instructions, including:
  - 1. Delivery, storage and handling recommendations.
  - 2. Preparation and application recommendations.
- D. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
- E. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- F. Installer’s Experience: Submit verification of evidence of work similar to the work of this Section.
- G. Warranty: Manufacturer’s 10 year warranty, from date of substantial completion, covering defects in materials.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer (applicator) who is acceptable to manufacturer, who has completed cement-based underlayment applications similar in material and extent to that required for this Project, and whose work has resulted in construction with a record of successful in-service performance.
- B. Mockups: Before installing underlayment, apply mockups to demonstrate qualities of materials and execution. Comply with the following requirements, using materials indicated for the completed Work:

1. Architect will select one area or surface to represent surfaces and conditions for application on each substrate required.
2. Notify Architect seven days in advance of dates and times when mockups will be applied.
3. Obtain Architect's approval of mockups before starting underlayment application.
4. Maintain mockups, during underlayment application and until installation of finish flooring, in an undisturbed condition as a standard for judging the completed Work.
5. Approved mockups may become part of the completed Work if undisturbed when finish flooring is installed.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing with other components, and application.
- B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects. Store at recommended temperature and humidity levels.
  1. Do not store materials at temperatures lower than 41 degrees F.
- C. Apply self-leveling underlayment only when substrate temperature is greater than 41 degrees F.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written recommendations for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and all conditions affecting underlayment performance.
- B. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.

#### 1.8 COORDINATION

- A. Coordinate cement-based underlayment with requirements of finish flooring products, including adhesives, specified in Division 9 Sections.
  1. Before installing surface sealers recommended by underlayment manufacturer, if any, verify compatibility with finish flooring installation adhesives.
  2. Obtain written verification from finish floor manufacturer representative(s) that cement-based underlayment installations acceptable and may accommodate the finished floor(s) scheduled.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Cement-based, polymer-modified, self-leveling underlayment for installation over concrete slabs.
    - a. K-15 Self-Leveling Underlayment Concrete; Ardex, Inc.
    - b. Ultraplan MB; Mapei Corporation.
    - c. Schönox US; Schönox HPS North America.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Underlayment Type 1:
1. Compressive Strength: To ASTM C109, 4,250 psi at 28 days.
  2. Flexural Strength: To ASTM C348, 1,000 psi at 28 days.
  3. Foot Traffic: 3 hours.

### 2.3 PRODUCTS AND MATERIALS

- A. Underlayment Type 1:
1. Aggregate: Well-graded, washed gravel, **1/8 to 1/4 inch** or coarse sand as recommended by underlayment manufacturer.
    - a. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
  2. Water: Potable and at a temperature of not more than **70 deg F**.
  3. Primer: Product of underlayment manufacturer recommended in writing for substrate, and site conditions.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance of underlayment including substrate moisture content. Begin underlayment application only after unsatisfactory conditions have been corrected.



### 3.2 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions for substrate indicated. Provide clean, dry, neutral-pH substrate for underlayment application.
  - 1. Mechanically remove friable substrate materials and repair areas to smooth finish using repair compound and methods in accordance with manufacturer's written recommendations
  - 2. Treat nonmoving substrate cracks to prevent cracks from telegraphing (reflecting) through underlayment according to manufacturer's written recommendations.
  - 3. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond according to manufacturer's written instructions.
- C. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

### 3.3 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
  - 1. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
  - 2. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply underlayment to produce uniform, smooth surface.
- D. Prime first layer only after it has reached final set and only when second layer is required. Use primer and methods in accordance with manufacturer's written recommendations.
- E. Apply a final layer without aggregate if required to produce smooth surface. Ensure second layer does not exceed thickness of first layer.
- F. Feather edges to match adjacent floor elevations; ensure surfaces are even and level.
- G. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- H. Do not install finish flooring over underlayment until after time period recommended by underlayment manufacturer.

- I. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

#### 3.4 FIELD QUALITY CONTROL

- A. Slump Test: If slump testing is recommended in writing by manufacturer, test underlayment for slump as it is placed for compliance with manufacturer's written recommendations.
- B. Field Samples: Take at least three molded-cube samples from each underlayment batch. Test samples according to ASTM C 109 for compliance with compressive-strength requirements. When requested, provide test results to Architect.

#### 3.5 PROTECTION

- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.
- B. At traffic areas, protect underlayment by placing temporary wood planking over finished underlayment work.
- C. Repair or replace adjacent materials damaged by application of underlayment.

END OF SECTION 035420

## SECTION 042000 - UNIT MASONRY ASSEMBLIES

### 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 unit masonry assemblies, including the following:

1. Concrete Masonry Units.
2. Face Brick.
3. Full Bed Manufactured Building Stone Veneer.
4. Mortar and Grout.
5. Reinforcing Steel.
6. Masonry Joint Reinforcement, Ties and Anchors.
7. Embedded Flashing.
8. Miscellaneous Masonry Accessories.
9. Cavity Wall Insulation.

- B. Related Sections include the following:

1. Division 3 Section "Cast-In-Place Concrete" for foundations and other concrete work in which unit masonry assemblies interface.
2. Division 4 Section "Cast Stone Masonry" for sills, caps and other masonry trim units.
3. Division 5 Section "Metal Fabrications" for steel lintels, plates and other supports installed in unit masonry assemblies.
4. Division 5 Section "Structural Steel Framing" for load-bearing members that bear onto unit masonry assemblies, or masonry veneers anchored directly to structural steel framing.
5. Division 7 Sections "Elastomeric Sheet Waterproofing" and "Cold Fluid-Applied Waterproofing" for below-grade or below-slab waterproofing systems that are applied to unit masonry.
6. Division 7 Sections "Thermal Insulation" and "Weather Barriers" for thermal and air and moisture barriers required to be installed with unit masonry assemblies.
7. Division 7 Sections "Foamed-In-Place Insulation" for spray-foam insulation required to be installed with unit masonry assemblies.
8. Division 7 Section "Sheet Metal Flashing and Trim" for metal flashings and other items that are to be installed on or within unit masonry assemblies.
9. Division 7 Section "Firestop Systems" for fire-rated through-wall penetrations and head-of-wall conditions of masonry walls.
10. Division 7 Section "Joint Sealants" for elastomeric sealant products applied to openings and perimeters of unit masonry assemblies.
11. Division 8 Section "Hollow Metal Doors and Frames" for hollow metal frames installed and grouted simultaneously within unit masonry walls and partitions.

### 1.3 DEFINITIONS

- A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

### 1.4 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following net-area compressive strengths ( $f'm$ ) at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

- 1. For Concrete Unit Masonry:  $f'm = 1,500$  psi.

### 1.5 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory, and other manufactured product specified, to comply with requirements in Division 1 Section "Submittals."

- B. Masonry Preinstallation Coordination Drawings: Preliminary Coordination Drawings shall be reviewed by all Prime Contractors prior to and during Preinstallation Conference.

- 1. Coordination Drawings: Participate in coordination drawing effort to determine potential conflicts between unit masonry assemblies and assemblies of other trades, as described in Division 1 Section "Project Coordination." Such masonry items include, but are not limited to, the following:

- a. Sizes and locations of all masonry openings, including related lintels.
- b. Horizontal masonry bond beams and horizontal and vertical reinforcing.
- c. Control and expansion joints.
- d. Locations of any concealed in-wall rainwater conductors and outlets.
- e. Locations for building structural items and systems.
- f. Piped sleeve locations and other foundation penetrations.

- C. Shop Drawings: Submit large-scale details of the following, at a scale of not less than 3 inches equaling 1 foot:

- 1. Flashings: Pre-fabricated flashing-type details, sections and installation methods, including, but not limited to, through-wall base flashing, sill flashing, head flashing, roof-to-wall flashing, cap flashing, corner flashing, end dam flashing, stepped flashing and two-piece flashing assemblies.
- 2. Special Shapes: Details and installation methods incorporating special shape units, where applicable.

- D. Special Conditions: Submit documentation of constructability issues as related to design, installation methods, applicable building code, fire-rating and/or compatibility conditions. Accompany documentation with most recent Technical Standards published by International Masonry Institute, National Concrete Masonry Association, Brick Industry Association and the product manufacturer's printed recommendations.

- 1. Compatibility Reports: Certification from foamed-in-place polyurethane insulation manufacturer indicating insulation is chemically and adhesively compatible with all adjoining cavity wall assembly materials, including, but not limited to, membrane and

metal flashing materials, sealants, backer rods, masonry reinforcing, masonry ties, gaskets, and similar materials. List all materials, if any, that may be damaged by coming into contact with foamed-in-place insulation, either by short-term or long-term contact. Refer to Division 7 Section "Foamed-In-Place Insulation."

- E. Samples for Initial Selection of the following:
  - 1. Unit masonry samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required. Submit face brick to show range of colors, texture and mortar types for matching existing brick. Submit concrete masonry samples to illustrate texture.
  - 2. Colored mortar samples showing the full range of colors available.
  
- F. Samples for Verification: For the following:
  - 1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
  - 2. Colored mortar Samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
  - 3. Weeps and vents, in mortar-matching color.
  - 4. Accessories embedded in the masonry.
  
- G. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, name of subcontractor/installer, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
  - 1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.
  
- H. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
  
- I. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
  - 1. Each type of masonry unit required.
    - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
    - b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units and gross-area compressive strength of clay bricks.
  - 2. Mortar complying with ASTM C 270.
  - 3. Grout mixes complying with compressive strength requirements of ASTM C 476. Include description of type and proportions of grout ingredients.

4. Submit concrete mix design for filling masonry cells and bond beams. Use concrete mix having a 28-day compressive strength of 3,000 psi.
- J. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
1. Each type of masonry unit required.
    - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
    - b. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.
  2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
  3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
  4. Each material and grade indicated for reinforcing bars.
  5. Each type and size of joint reinforcement.
  6. Each type and size of anchor, tie, and metal accessory.
- K. Hot and Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with hot and cold-weather requirements.

#### 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.
- B. Source Limitations for Masonry Units: Obtain each type of exposed masonry unit of a uniform texture and color, through one source from a single manufacturer and manufacturing plant.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- D. Responsibility of Foamed-In-Place Insulation: To ensure cavity wall-applied spray foam insulation and accessory materials will be compatible with and non-harmful to all other materials in which it contacts, including backup unit masonry and other components, and to assist in the sequencing and scheduling of construction activities, it is strongly recommended that the unit masonry Installer is responsible for all cavity-applied foamed-in-place insulation. Therefore, the cavity spray foam insulation Installer shall be a sub-subcontractor under the masonry subcontractor; otherwise, the unit masonry Installer and the cavity foamed-in-place insulation Installer shall be subcontractors under the General Contractor, in which the scope and sequencing of work must be very closely coordinated.

- E. Testing Service: The Owner shall engage a qualified independent testing agency to perform tests in compliance with applicable codes. Refer to Paragraph 3.15 – Field Quality Control for Contractor-required testing.
- F. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per applicable Code by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
- G. Sample Panels: Prior to installation of above grade unit masonry, build sample panels, using singlewythe veneer materials selected for the completed Work. Build sample panels for each type of veneer masonry in sizes approximately 48 inches long by 48 inches high by full unit thickness.
1. Locate panels in the locations indicated or, if not indicated, as directed by Architect.
    - a. Panels consisting of salvaged brick or new brick and mortar required to match existing brick and mortar shall be constructed adjacent to existing-to-remain walls, at locations indicated by Architect.
  2. Clean exposed faces of panels with masonry cleaner indicated.
  3. Protect approved sample panels from the elements with weather-resistant membrane.
  4. Maintain sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
  5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
    - a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels, unless such deviations are specifically approved by Architect in writing.
    - b. Demolish and remove sample panels when directed.
- H. Mockup Panels: Prior to installation of above grade unit masonry, allowing sufficient time for construction and approval, build mockup panels, using materials and products indicated for the completed Work, to verify selections made under sample Submittals and to demonstrate aesthetic effects. Build mockup panels for each type of unit masonry assembly in sizes of full assembly thickness by approximately 16 feet long by 6 feet high or larger to accommodate all necessary components. Mockup shall be constructed in “Z” shape to provide stability to panel and to display inside and outside corner craftsmanship of veneer and panel assemblies.
1. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  2. Locate mockups in the locations indicated or, if not indicated, as directed by Architect.
  3. To demonstrate detailing with both types of veneers, provide masonry openings using two separate aluminum storefront frames, as well as steel lintels, sills and associated blocking and flashing as detailed on the Drawings and as indicated in this Section.
  4. Veneers and Panels: Install both types of new masonry veneer in the mockup, which shall include utility face brick and full bed manufactured building stone veneer. Each type of veneer shall compose approximately one half of the mockup. Also install

insulated metal panel assembly, representing each selected color and texture, including all associated accessories.

- a. The brick veneer portion shall include one 6-foot-long portion, an outside corner, and a 4-foot-long return. The insulated metal panel assembly shall cover approximately the top half of the brick veneer walls, from the final 2 feet of the 6-foot-long wall, the outside corner, and the entire final 4-foot-long return.
  - b. The stone veneer portion shall include one 6-foot-long portion and return around the end of the mockup panel approximately 2 feet to simulate a blade wall.
5. Include metal coping at stone veneer portion and roof edge fascia at brick and insulated metal panel portions. Install through-wall overflow roof scuppers in brick and stone veneer assemblies as well as insulated metal panel assembly. Include associated blocking and fasteners as detailed on the Drawings and as indicated in Division 7 Section "Sheet Metal Flashing and Trim."
  6. Omit portions of veneer, sill, coping, fascia and aluminum frames in order to provide viewable "cut-away" areas and items of construction ordinarily hidden behind finished wall construction. Coordinate with Architect prior to Mockup Panel construction.
  7. Build mockups for unit masonry and insulated metal panel assemblies in sizes required by full assembly thickness. Unit masonry assemblies shall include face veneer, air space, insulation, backup, reinforcing and accessories. Include a sealant-filled vertical joint at least 16 inches long in both veneer types, which shall match the adjacent mortar colors to the greatest extent possible. Insulated metal panel assemblies shall include each type of metal panel and associated accessory, light-gauge metal framing and backup masonry.
  8. Clean exposed faces of mockups with masonry cleaners as indicated.
  9. Protect accepted mockups from the elements with weather-resistant membrane.
  10. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  11. Approval of mockup panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; verification of material compatibility; incorporation of specified and detailed products and accessories and other material and construction qualities specifically approved by Architect in writing.
    - a. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.
  12. Demolish and remove mockups only when directed by Architect.
- I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.



1. Protect concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

#### 1.8 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
  2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
  2. Protect sills, ledges, and projections from mortar droppings.
  3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. 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 50 deg F and above and will remain so until masonry has dried, but not less than 7 days

after completing cleaning. Follow manufacturer's recommendations for minimum temperature.

- E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
  - 1. When ambient temperature exceeds 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

## PART 2 - PRODUCTS

### 2.1 FULL BED MANUFACTURED BUILDING STONE VENEER

- A. General: Cement-free, manufactured calcium silicate building stone units, formed under high-pressure compression, autoclaved and custom-shaped; manufactured in compliance with ASTM C 73, Grade SW. Solid, modular veneer units, consisting of various dimensions and shapes; set in full beds of mortar.
  - 1. Shapes and Sizes: Special shapes, available in three basic sizes, as follows:
    - a. **Ariscraft International- stone veneer to match existing building**
  - 2. Texture: Rocked and tumbled finish on exposed faces, including end units for building corners and openings. Units may be cut, chiseled, dressed or worked in the field.
  - 3. Color: Through-bodied color, with natural resistance to fading and bleaching. Various colors, striations and tones created by compressed calcium silicates.
    - a. Color Selection: As indicated per basis-of-design product.
  - 4. Accessories: Provide custom-cast stone trim units and accents, including keystones, sills, bases, headers, wall caps and other shapes, as indicated.
    - a. Colors and Textures: As selected by Architect from manufacturer's full range of available colors and textures.
- B. Fabrication Tolerances: Fabricate calcium silicate building stone units to a pressed tolerance of plus or minus 1/8 inch.
- C. Basis-of-Design Product: Subject to compliance with requirements, provide Ariscraft International; a General Shale company, **"Match Existing School" or comparable full bed manufactured building stone veneer or natural building stone product with Beth-Hanover Supply Company mortar**, subject to approval by the Architect.

### 2.2 MORTAR AND GROUT 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.

- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C 150, Type I or III, and hydrated lime complying with ASTM C 207, Type S.
- D. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
  - 1. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
- E. Aggregate for Grout: ASTM C 404.
- F. 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 masonry mortar.
- G. Water: Potable.
- H. Available Products: Subject to compliance with requirements and suitability as reviewed by the Engineer, products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Colored Portland Cement-Lime Mix:
    - a. Eaglebond; Blue Circle Cement.
    - b. Color Mortar Blend; Glen-Gery Corporation.
    - c. Rainbow Mortamix Custom Color Cement/Lime; Holnam, Inc.
    - d. Centurion Colorbond PL; Lafarge Corporation.
    - e. Lehigh Custom Color Portland/Lime; Lehigh Portland Cement Co.
    - f. Riverton Portland Cement Lime Custom Color; Riverton Corporation (The).
  - 2. Mortar Pigments:
    - a. True Tone Mortar Colors; Davis Colors.
    - b. Centurion Pigments; Lafarge Corporation.
    - c. SGS Mortar Colors; Solomon Grind-Chem Services, Inc.

### 2.3 REINFORCING STEEL

- A. Uncoated Steel Reinforcing Bars: ASTM A 615; Grade 60.

### 2.4 MASONRY JOINT REINFORCEMENT

- A. General: ASTM A 951 and as follows:
  - 1. Hot-dip galvanized, carbon-steel wire for both interior and exterior walls.
  - 2. Wire Size for Side Rods: W1.7 or 0.148-inch diameter, unless otherwise noted.
  - 3. Wire Size for Cross Rods: W1.7 or 0.148-inch-diameter, unless otherwise noted.

4. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.
- B. For single-wythe masonry, provide either ladder or truss type with single pair of side rods and cross rods spaced not more than 16 inches o.c. Truss type shall not be used in vertically reinforced unit masonry walls.
- C. For multiwythe masonry, provide types as follows:
1. Adjustable (two-piece) type with single pair of side rods and cross ties spaced not more than 16 inches o.c. and with separate adjustable veneer ties engaging the cross ties. Crossties are either U-shaped with eyes or rectangular. Space side rods for embedment within each face shell of backup wythe and size adjustable ties to extend at least halfway through outer wythe but with at least 5/8-inch cover on outside face. Unless otherwise indicated, install in first and second courses above finished floor and in alternating back-up masonry courses thereafter.
    - a. Use where indicated and where horizontal joints of facing wythe do not align (1-1/4 inches or less) with those of backup wythe.
    - b. Use where facing wythe is of different material than backup wythe.
    - c. Basis-of-Design Product: Equal to Hohmann & Barnard, Inc. “#270 Ladder Eye-Wire” anchor system.
  2. Adjustable (three-piece) type with ladder type reinforcement at back-up wythe which includes an extended cross rod. A vertical rod is hooked onto the extended cross rod and extends down to and behind the cross rod of the next lower truss type unit. An adjustable Vee-tie is hooked around the vertical rod for placement into the mortar joint of the face veneer.
    - a. Use where indicated and where horizontal joints of facing wythe do not align (greater than 1-1/4 inches) with those of the back-up wythe.
    - b. Basis-of-Design Product: Equal to Hohmann & Barnard, Inc. “Tie-HVR” anchor system.

## 2.5 TIES AND ANCHORS, GENERAL

- A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, and as required by Building Code Requirements for Masonry Structures; use of hot-dipped galvanized ties and anchors in exterior wall construction.
- B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
- C. Galvanized Steel Sheet: ASTM A 653, G60, commercial-quality, steel sheet zinc coated by hot-dip process on continuous lines before fabrication.
- D. Steel Sheet, Galvanized after Fabrication: ASTM A 366 cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153.
- E. Steel Plates, Shapes, and Bars: ASTM A 36; plates, shapes, and bars exposed to weather shall be hot-dipped galvanized after fabrication.

## 2.6 ADJUSTABLE ANCHORS FOR CONNECTING TO STEEL FRAME OR LINTELS

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section: Crimped 1/4-inch-diameter, hot-dip galvanized steel wire anchor section for welding to steel.
  2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch diameter, hot-dip galvanized steel wire.

## 2.7 ANCHORS FOR CONNECTING TO CONCRETE

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Basis-of-Design Product: Equal to Hohmann & Barnard, Inc. "DW-10® Series" veneer anchors.

## 2.8 JOINT STABILIZATION ANCHORS

- A. General: Provide stabilization anchors in horizontal joints of masonry units across the joint between walls at T-shape wall intersections as follows:
1. Use either a manufactured steel joint stabilizing anchor consisting of two steel rods, connected together on each side of masonry joint by sliding plate assemblies, or 1-1/2 inches by 1/4 inch by 32 inches steel strap anchor with 3-inch, right-angle (90-deg) -bent ends at masonry shear walls.
  2. Anchors shall be embedded in grout-filled cores of hollow concrete masonry units, with vertical spacing at 16 inches o.c.
  3. Finish: Mill galvanized or hot-dip galvanized, in compliance with ASTM A 153.

## 2.9 ADJUSTABLE MASONRY-VENEER ANCHORS

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment through insulation to metal studs, and as follows:
1. 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.
- B. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie section and a metal anchor section complying with the following requirements:
1. Anchor Section: Gasketed sheet metal plate with screw holes top and bottom; top and bottom ends bent to form pronged legs to penetrate insulation/sheathing and contact studs; and raised rib-stiffened strap stamped into center to provide a slot between strap and plate for connection of wire tie.

- a. Plate: 1-1/4 inches wide by 6 inches long with strap 5/8 inch wide by 6 inches long; slot clearance formed between face of plate and back of strap shall not exceed diameter of wire tie by more than 1/32 inch.

- b. Gaskets: Anchor manufacturer's standard, self-adhering gaskets fabricated to fit behind anchor plate and to prevent moisture from penetrating sheathing at pronged legs and screw holes.
2. Basis-of-Design Product: Subject to compliance with requirements, provide screw-attached masonry-veneer anchor assemblies equal to Hohmann & Barnard, Inc. "X-SEAL," with box tie with drip and tape equal to "X-SEAL Tape."

## 2.10 MISCELLANEOUS ANCHORS

- A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron inserts of type and size indicated.
- B. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations:
  1. Headed bolts.
  2. Non-headed bolts, bent in manner indicated.
- C. Post-installed Anchors: Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
  1. Type: Chemical, expansion or undercut anchors, as indicated or as required for application.
  2. For Post-installed Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
  3. For Post-installed Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.

## 2.11 EMBEDDED FLASHING MATERIALS

- A. Exposed Flashing: Fabricate from the following metals, complying with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim" and below:
  1. Through-Wall Flashing: For roof-to-wall conditions and other locations indicated. Fabricate from 26-gauge (0.018-inch) -thick, Type 304 stainless steel, formed to shape indicated.
  2. Expansion-Joint Waterstops: Fabricate from 26-gauge (0.018-inch) -thick, Type 302 stainless steel, formed to shape indicated.
  3. Drip Edges: Provide as a termination for through-wall membrane flashing, where occurs; fabricate to 3-inch widths with factory- or shop-formed hemmed edge, bent to configurations indicated, of the following materials:
    - a. Gray- or Beige-Colored Veneers: Fabricate from 22-gauge (0.030-inch) -thick, Type 304 stainless steel.
    - b. Red- or Brown-Colored Veneers: Fabricate from 20-oz/sq. ft. sheet copper.
  4. Available Manufacturers: Subject to compliance with requirements, manufacturers that may be incorporated into the Work include the following:

- a. Cheney Flashing Company, Inc.
  - b. Sandell Moisture Protection Systems; a Hohmann & Barnard company.
- 5. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 Section "Sheet Metal Flashing and Trim."
- B. Concealed Flashing: For flashing partly exposed to the exterior, use metal flashing specified above. For flashing not exposed to the exterior, use one of the following types, based on material compatibility:
  - 1. Ethylene Propylene Diene Terpolymer (EPDM): Synthetic rubber; flexible 40-mil-thick elastomeric membrane; non-adhesive-backed type, unless otherwise indicated. Use only when foamed-in-place cavity wall insulation, in combination with transition membranes and other accessories, is verified by spray foam manufacturer to be compatible with through-wall flashing. Refer to Division 7 Section "Foamed-In-Place Insulation."
    - a. Available Manufacturers and Products: Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include the following:
      - 1) Carlisle Coatings & Waterproofing, Inc.; Carlisle Pre-Kleened EPDM.
      - 2) Firestone Building Products Company; Flashguard Thru-Wall Flashing.
    - b. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by the flashing manufacturer for bonding flashing sheets to each other and to substrates.
  - 2. Metal Flashing: Stainless steel or copper, as indicated above for exposed flashing. Use as concealed flashing only when foamed-in-place cavity wall insulation assemblies are verified by spray foam manufacturer to NOT be compatible with through-wall flashing or other cavity wall materials. Refer to Division 7 Section "Foamed-In-Place Insulation."

## 2.12 MISCELLANEOUS MASONRY ACCESSORIES AND MATERIALS

- A. Compressible Expansion Material: Closed cell neoprene sponge with pressure-sensitive adhesive on one side; ASTM D 1056, Grade 2A1.
  - 1. Available Manufacturers and Products: Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include the following:
    - a. Hohmann & Barnard, Inc.; NS.
    - b. Dur-O-Wal; D/A 2015.
    - c. Sandell Moisture Protection Systems; a Hohmann & Barnard company.
- B. Compressible Filler: Open cell polyurethane foamed-in-place insulation, where indicated to be placed between the top of wall and bottom of floor or roof deck, to provide an acoustic barrier and seal off adjacent spaces. Where exposed to view, compressible filler shall be neatly applied and painted.
  - 1. Basis-of-Design Product: As indicated in Division 7 Section "Foamed-In-Place Insulation."



- C. Compressible Exterior Expansion Joint Filler: Silicone-faced, acrylic-impregnated expanding foam sealant and closed-cell foam sealant system. ASTM E 1105, compressible up to 50 percent; of width and thickness indicated. Colors shall be as selected by Architect, from full range of standard and special colors as required to match associated mortar or masonry colors.
1. Basis-of-Design Product: Equal to Emseal Joint Systems, Ltd. "Colorseal."
- D. Pre-formed Control Joint Gaskets: Styrene-Butadiene-Rubber Compound designed to fit standard sash block and to maintain lateral stability in masonry wall. ASTM D 2000, Designation M2AA-8.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
    - a. Hohmann & Barnard, Inc.
    - b. Dur-O-Wal; a Hohmann & Barnard company.
    - c. Sandell Moisture Protection Systems; a Hohmann & Barnard company.
- E. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- F. Sill Weep: 100 percent virgin high-impact polystyrene; 2-1/4-inch-wide weep legs at 9-1/2 inches on center with 1-inch-wide continuous belt, and total width of 6 inches. Sill weep shall be installed on top face of flashing with continuous belt centered at masonry opening (i.e., window sill flashing conditions only). Fabric skirt shall overlap continuous belt and run vertically up exterior face of flashing material.
1. Basis-of-Design Product: Provide equivalent to the following combination:
    - a. Masonry Technologies Incorporated "CV 5010;" creates 4 weep holes every 9-1/2 inches.
    - b. Masonry Technologies Incorporated "SCMM2516" and 10mm "Sure Cavity" fabric.
- G. Cavity Drainage Material: Free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings, thickness to match cavity air space.
1. Basis-of-Design Product: Equal to Mortar Net USA, Ltd. "Mortar Net."
- H. Cavity Weeps and Vents:
1. Available Manufacturers and Products: Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include the following:
    - a. Mortar Net USA, Ltd. "Mortar Net Weep Vents;" polyester mesh.
    - b. Hohmann and Barnard, Inc. "Quadro-Vent;" polypropylene with honeycomb design; tested in conformance with ASTM D 2240, ASTM D 790B, ASTM D 638 and ASTM D 1238B.
  2. Colors: As selected by Architect, from full range of standard and special colors as required to match adjacent mortar colors.
  3. Sizes: Up to 4 inches nominal; full height of standard or utility brick courses; for 8-inch-nominal-height masonry veneers, use 4-inch-high weeps.

- I. Cavity Vapor Retarders: To only be used where foamed-in-place cavity insulation is not used, unless otherwise indicated. Use the following type, depending on back-up material.
  - 1. Concrete Masonry Cavity Walls: Asphalt-based, non-fibered emulsion-type, which permits moisture vapor to escape through the film while remaining resistant to water penetration; per ASTM D 1187 and ASTM D 1227. Product shall be compatible with contacted surfaces and materials, including rigid cavity board insulation.
    - a. Available Manufacturers and Products: Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include the following:
      - 1) Karnak Corporation; Karnak 100AF.
      - 2) W.R. Meadows, Inc.; Sealmastic.
  - 2. Gypsum Sheathing: Spun-bonded weather-resistant barrier which permits moisture vapor to escape through the barrier while remaining resistant to water penetration ASTM D 882, ASTM E 96, ASTM D 882, and AATCC 127.
    - a. Manufacturers and Products: Refer to Division 7 Section “Weather Barriers.”
  
- J. Cavity Insulation: Rigid extruded-polystyrene board cavity insulation; ASTM C 578, Type IV, with compressive strength of 25 psi. To only be installed where specifically indicated and/or where foamed-in-place cavity insulation is not required. Use the following type, depending on back-up material.
  - 1. Thermal Properties: Minimum continuous R-Value of 5.0 per inch; 2-inch-thick shall be the equivalent of R-10.
  - 2. Concrete Masonry Units: 16 by 96 inches, square-edged.
    - a. Available Manufacturers and Products: Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include the following:
      - 1) Owens-Corning Co. “Foamular 250.”
      - 2) Dow Chemical Co. “Cavitymate”
  - 3. Gypsum Sheathing: 48 by 96 inches; shiplap- or tongue-and-groove-edged.
    - a. Available Manufacturers and Products: Subject to compliance with requirements, manufacturers and products that may be incorporated into the Work include the following:
      - 1) Owens-Corning Co. “Foamular 250.”
      - 2) Dow Chemical Co. “Cavitymate SC.”
  
- K. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells, with loops for holding reinforcing bars in center of cells. Units shall be formed from 0.142-inch steel wire.
  
- L. Gypsum Sheathing: Gypsum sheathing conforming to ASTM C 1177 and ASTM E 84, with glass mats both sides and long edges, water-resistant-treated core. Subject to compliance with requirements of Division 6 Section “Sheathing.”

## 2.13 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 new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
1. Available Manufacturers and Products: Subject to compliance with requirements, manufacturers and products that may be used to clean unit masonry surfaces include, but are not limited to, the following:
    - a. Cleaners for Red and Light-Colored Brick, Not Subject to Metallic Staining with Mortar Not Subject to Bleaching:
      - 1) Diedrich Technologies, Inc. "202 New Masonry Detergent."
      - 2) PROSOCO, Inc. "Sure Klean 600 Detergent."
    - b. Cleaners for Red and Dark-Colored Brick, Not Subject to Metallic Staining:
      - 1) Diedrich Technologies, Inc. "200 Lime Solv."
      - 2) PROSOCO, Inc. "Sure Klean No. 101 Lime Solvent."
    - c. Cleaners for Brick Subject to Metallic Staining:
      - 1) Diedrich Technologies, Inc. "202V Vana-Stop."
      - 2) PROSOCO, Inc. "Sure Klean Vana Trol."

#### 2.14 MORTAR AND GROUT MIXES

- A. General: Do not use calcium chloride. The use of admixtures shall not be considered unless their suitability is reviewed by the Engineer and demonstrated by laboratory test results simulating the conditions that warrant the desired use of the admixture.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.
1. Limit cementitious materials in mortar to Portland cement and hydrated lime.
  2. For masonry below grade, in contact with earth, and where indicated, use Type M mortar with one part Portland cement, 1/4 part Type S hydrated lime and 3-3/4 parts sand, with minimum 28-day compressive strength of 2,500 psi.
  3. For above grade walls use Type N mortar with 1 part Portland cement, 1 part hydrated lime Type S and 6 parts sand.
- D. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required. Limit pigments to the following percentages of cement content by weight:
1. For mineral-oxide pigments and Portland cement-lime mortar, not more than 10 percent.
  2. For carbon-black pigment and Portland cement-lime mortar, not more than 2 percent.
  3. For mineral-oxide pigments and mortar cement mortar, not more than 5 percent.
  4. For carbon-black pigment and mortar cement mortar, not more than 1 percent.

- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates combined with selected cementitious materials.
  - 1. Basis-of-Design Product for New Utility Brick: Equal to Glen Gery Corporation "Colored Mortar Blend G202."
  - 2. Salvaged Brick or New Brick to Match Existing Brick: Provide mortar blend color to match existing mortar color.
  - 3. Full Bed Manufactured Building Stone Veneer and Decorative Concrete Masonry Units: Color and texture as selected by Architect from manufacturer's full range of colors.
  
- F. Grout for Unit Masonry:
  - 1. Use either pea gravel cement concrete or grout confirming to ASTM C476 with a minimum 28-day compressive strength of 3,000 psi.
  - 2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

#### 2.15 SOURCE QUALITY CONTROL

- A. Brick Tests: For each type and grade of brick indicated, meet the requirements in the "Brick" Paragraph of this Section. Units will be tested according to ASTM C 67.
  
- B. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, meet the requirements in the "Concrete Masonry Units" Paragraph of this Section. Units will be tested according to ASTM C 140.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
  - 2. Verify that foundations are within tolerances specified.
  - 3. Verify that reinforcing dowels are properly placed.
  - 4. Proceed with installation only after unsatisfactory conditions have been corrected.
  
- B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

#### 3.2 INSTALLATION, GENERAL

- A. Unit Masonry Assemblies shall be installed in accordance with Contract Documents, most recent technical standards published by International Masonry Institute, National Concrete Masonry Association, Brick Industry Association and the product manufacturer's printed recommendations.

- B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.
- C. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.
- D. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.
- E. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- F. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
  - 1. Mix units from several pallets or cubes as they are placed.
- G. Wetting of Brick: Wet brick 3 to 24 hours before laying if the initial rate of absorption exceeds 20 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at the time of laying.
- H. No conduit or pipe shall be installed vertically or horizontally in the cavity, except for items such as wall hydrants, electrical fixtures, and downspout nozzles, for which penetrations shall be horizontal, perpendicular through cavity, located directly at the intended item.

### 3.3 CONSTRUCTION TOLERANCES

- A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:
- B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, nor 1/2 inch maximum.
- D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.

- F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

### 3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
  - 1. For Modular Brick: Where laying modular brick in existing walls, match existing bond pattern; at other locations, provide one-half running bond with vertical joint in each course centered on units in courses above and below.
  - 2. For Utility Brick: Provide one-third running bond at utility size face brick with vertical joint in each course centered on units in courses above and below.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified under this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
- G. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- H. Entire courses and/or individual units of irregular surface-faced masonry (i.e., manufactured building stone veneer) shall be turned smooth side out or ground smooth in locations as directed by Architect during Preinstallation Conference.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.
  - 1. Install compressible filler in joint between top of partition and underside of structure above.
  - 2. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Firestop Systems."

### 3.5 MORTAR BEDDING AND JOINTING

#### A. Lay hollow masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.

#### B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and compress into place. Do not deeply furrow bed joints or slush head joints.

1. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.

#### C. Set cast stone trim units in full bed of mortar with vertical joints slushed full. Fill dowel, anchor, and similar holes solid. Wet stone-joint surface thoroughly before setting; for soiled cast stone surfaces, clean bedding and exposed surfaces with fiber brush and soap powder and rinse thoroughly with clear water.

#### D. Site wall copings or caps, including cast stone, concrete and masonry, shall be set on through-wall flashing. Extend flashing full wall thickness, a minimum of 1 inch beyond the exterior faces of the masonry. Seal laps between lengths of flashing with lap sealant, overlap 2 to 3 inches. Provide water-tight seal around anchors using flashing manufacturer's recommended products. Trim off flashing as indicated in Paragraph 3.12. Tool exposed joints to a point 3/8 inch below face of coping or cap material. Apply continuous sealant bead in tooled joints. Sealant shall match site wall mortar color.

#### E. Sill Units, including Stone, Concrete and Masonry: Tool exposed joints to a point 3/8 inch below face of material. Apply continuous sealant bead in tooled joints. Sealant shall match mortar color.

#### F. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.

#### G. Collar Joints in Clay Tile Masonry: After each course is laid, fill the vertical, longitudinal joint between wythes solidly with grout at exterior walls, except cavity walls, and solidly with mortar at interior walls and partitions.

### 3.6 BONDING OF MULTI-WYTHE MASONRY

#### A. Use masonry joint reinforcement installed in horizontal mortar joints to bond wythes together.

#### B. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.

1. Provide continuity with masonry joint reinforcement at corners by using prefabricated "L" units as well as masonry bonding.

C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together by providing continuity with masonry joint reinforcement, using prefabricated T-shaped units.

### 3.7 CAVITIES

A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints of back-up wall wythes facing cavities flush.

B. Installing Cavity Wall Insulation:

1. Spray Foam Insulation: Install on all backup concrete unit masonry cavity walls, unless otherwise indicated, including accessories, in accordance with Division 7 Section "Foamed-In-Place Insulation."

- a. Ensure transition membranes are adequately applied to cavity wall materials that would otherwise come into contact with spray foam insulation, including concealed thru-wall membrane flashing, control and expansion joints, wood blocking, penetrations, openings and other dissimilar materials or changes in construction. Verify transition membranes are securely adhered to substrates, capped with termination bars, where appropriate, and properly sealed with transition membrane manufacturer-approved adhesive, sealant, mastic or tape products.
- b. Verify that metal insulation stops have been properly secured to each side of control and expansion joints and similar construction to avoid spray foam insulation from bridging over required gaps.
- c. Confirm compatibility of all cavity wall materials prior to proceeding with veneer work. Report any materials that have been discovered to be damaged or deteriorated to the Architect immediately.

2. Rigid Board Insulation: Install on sheathing in metal-framed walls and, only where specifically indicated, on backup concrete unit masonry cavity walls. Apply rectangular grid adhesive on inside face of insulation boards. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

- a. Seal or tape all insulation board joints, cracks and gaps, and piping, conduit and other penetrations, with materials compatible with insulation and other construction.

### 3.8 MASONRY JOINT REINFORCEMENT

A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.



1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
  - a. Reinforcement above is in addition to continuous reinforcement.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

D. At all flashing locations, reinforcement shall not interrupt the flashing.

### 3.9 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Anchor masonry to structural members with flexible channel slot anchors embedded in masonry joints and attached to the structure. Provide a 1-inch-wide space between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
2. Space anchors at the location of the slotted channel anchor assembly on the structure member.

### 3.10 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake joints in exposed faces. Maximum distance between concrete masonry unit control joints shall not exceed distances as indicated on Structural Drawings.
2. Install preformed control-joint gaskets designed to fit sash block.

C. Form building expansion joints in exterior masonry veneer by forming open joint of width indicated; install compressible exterior expansion joint filler as per manufacturers' recommendation. Keep all joints free and clear of mortar. Space at locations indicated on the Drawings.

D. Build in pressure-relieving expansion joints where indicated; construct joints by installing compressible expansion material.

### 3.11 LINTELS

- A. Install lintels where indicated.
- B. Provide lintels at all masonry wall openings greater than 12 inches wide. Refer to Lintel Schedule in the Structural Drawings.

### 3.12 FLASHING, WEEPS, AND VENTS

- A. General: Install continuous embedded flashing and weeps in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Unless otherwise indicated, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer. Adhere all flashing to steel angles.
- C. Install flashing under the various conditions indicated below. Flashing materials noted to be membrane are indicated under the assumption that they are compatible with foamed-in-place insulation assemblies; otherwise, metal flashing shall be used, as indicated in Paragraph 2.13:
  - 1a. At through-wall base flashing conditions and masonry relieving angles at composite masonry walls, including cavity walls, extend the through-wall flashing from a point of 1 inch beyond the exterior face of the outer wythe of masonry, and continue through the outer wythe, air space and insulation, and then turn it up a minimum of 16 inches behind the insulation, (but over the vapor retarder when rigid board insulation is used), and then into the inner wythe for a distance of 1-1/2 inches. Adhere the metal drip edge with elastomeric sealant or manufacturer's approved bonding tape, creating a 1/4-inch drip edge. Seal the laps between the lengths of flashing with lap sealant, overlapping a minimum of 4 inches. Seal laps between the lengths of the drip edge with lap sealant, also overlapping a minimum of 4 inches. Provide positive drainage to the weeps where the bottom of the flashing turns outward to the outer wythe. Install backer rod and sealant under the drip edge at masonry relieving angle conditions.
  - 1b. At through-wall base flashing conditions, as well as masonry relieving angles at metal stud masonry veneer walls, extend the through-wall flashing from a point of 1 inch beyond the exterior face of the outer wythe of masonry, and continue through the outer wythe, air space and insulation, and then turn it up a minimum of 14 inches, behind the insulation and commercial building wrap, on the exterior face of the sheathing, overlapping a minimum of 4 inches. The vertical leg of the flashing shall be adhered to the face of the sheathing, using the flashing manufacturer's approved bonding adhesive. Adhere the metal drip edge with elastomeric sealant or manufacturer's approved bonding tape, creating a 1/4-inch drip edge. Seal the top of the through-wall flashing to the sheathing in accordance with flashing manufacturer's recommended termination seal system. Seal the bottom of the commercial building wrap to the through-wall flashing, using the membrane manufacturer's flashing tape. Seal laps between lengths of the flashing with lap sealant, overlapping a minimum of 4 inches. Seal the laps between lengths of the drip edge with lap sealant, also overlapping a minimum of 4 inches. Install backer rod and sealant under the drip edge at masonry relieving angle conditions.

- 1c. At masonry opening sill flashing conditions, such as windows and louvers, extend the through-wall flashing from a point of 1 inch beyond the exterior face of the outer wythe of masonry, and continue through the outer wythe, air space and insulation, turned up vertically and continuing horizontally below the sill of the masonry opening frame to meet the angle flashing stop. The flashing shall extend vertically in the joint between the masonry opening frame and the vertical leg of the angle flashing stop, terminating just below the top edge. The flashing shall be concealed below the joint sealant. Seal laps between lengths of the flashing with lap sealant, overlapping a minimum of 4 inches. Extend the flashing at the ends of the sill and turn it up not less than 2 inches to form a pan. Install continuous sill weep material horizontally, on top of the flashing and trim, flush with the exterior face of the masonry. Adhere the metal drip edge with elastomeric sealant or manufacturer's approved bonding tape, creating a 1/4-inch drip edge. Seal laps between the lengths of flashing with lap sealant, also overlapping a minimum of 4 inches. Provide positive drainage to the weeps where the bottom of the flashing turns outward to the outer wythe.
2. At lintels and shelf angles, extend the through-wall flashing for a minimum of 4 inches into the masonry at each end, or to cover the extents of the lintel, whichever is greater. At the heads and sills, extend the flashing at the ends and turn the flashing up not less than 2 inches to form a pan. Extend the through-wall flashing from a point of 1 inch beyond the exterior face of the outer wythe of masonry, and continue through the outer wythe, air space and insulation, and then turn it up a minimum of 16 inches behind the insulation (but over the vapor retarder when rigid board insulation is used), and then into the inner wythe for a distance of 1-1/2 inches. Adhere the metal drip edge with elastomeric sealant or the manufacturer's approved bonding tape, creating a 1/4-inch drip edge. Seal the laps between lengths of flashing with lap sealant, overlapping a minimum of 4 inches. Seal laps between lengths of drip edge with lap sealant, overlapping a minimum of 4 inches. Provide positive drainage to the weeps where the bottom of the flashing turns outward to the outer wythe. Install backer rod and sealant under the drip edge at masonry relieving angle conditions.
- 3a. At low-roof to high-wall conditions, composite masonry walls, including cavity walls, install two-piece, interlocking, 26-gauge stainless steel sheet flashing through the outer wythe of masonry. Turn up the embedded portion of the flashing for a minimum of 2 inches, flush with the inner wythe of masonry at the cavity, forming a pan behind the insulation. Overlap the ends of the stainless steel flashing a minimum of 6 inches and seal the lap with elastomeric sealant. Extend the through-wall flashing from a point of 1 inch behind the exterior face of the outer wythe of masonry, and continue through the outer wythe, air space and insulation, and then turn it up a minimum of 16 inches, behind the insulation (but over the vapor retarder when rigid board insulation is used), and into the inner wythe for a distance of 1-1/2 inches. Seal the lap between the stainless steel flashing and the through-wall flashing with elastomeric sealant. Install the interlocking piece of flashing over the roof termination, as indicated on the Drawings.
- 3b. At low-roof to high-wall conditions, at metal stud masonry veneer walls, install two-piece, interlocking, 26-gauge stainless steel sheet flashing through the outer wythe of masonry. Turn up the embedded portion of the flashing for a minimum of 2 inches, flush with inner wythe of masonry at the cavity, forming a pan behind insulation. Overlap the ends of the stainless steel flashing a minimum of 6 inches and seal the lap with elastomeric sealant. Extend the through-wall flashing from a point of 1 inch behind

the exterior face of the outer wythe of masonry, and continue through the outer wythe, air space and insulation, and then turn it up a minimum of 14 inches, behind the insulation and commercial building wrap, on the exterior face of the sheathing, overlapping a minimum of 4 inches, with the vertical leg of the flashing adhered to the sheathing, using the flashing manufacturer's approved bonding adhesive. Seal the lap between the stainless steel flashing and the through-wall flashing with elastomeric sealant. Install the interlocking piece of flashing over the roof termination, as indicated on the Drawings. Seal the top of the through-wall flashing to the sheathing in accordance with the flashing manufacturer's recommended termination seal system. Seal the bottom of the vapor retarder to the through-wall flashing with the membrane manufacturer's flashing tape.

Note: Through-wall flashing must be extended into the backup CMU mortar joints, as indicated above as well as on the Drawings. Adhering and terminating through-wall flashing to the vertical face of backup concrete masonry units, whether or not it is capped with a sealed termination bar, is NOT ACCEPTABLE...NO EXCEPTIONS.

- D. Install cavity weeps, cavity vents, sill sweeps and cavity drainage material in the head joints in exterior wythes of masonry as indicated on Drawings, and as follows:
  - 1. Space cavity weeps at a minimum of 24 inches o.c.; space at 16 inches o.c. when using 16-inch-long masonry units.
  - 2. Space cavity vents at a minimum of 48 inches o.c.
  - 3. Install continuous sill weep material horizontally on, top of flashing.
  - 4. Place continuous cavity drainage material immediately above flashing in cavities.
  - 5. Test weep with water poured into cavity to insure draining water freely comes out of each weep hole.
- E. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- F. Only when using rigid board insulation, apply cavity vapor retarder on the entire exterior face of either the inner wythe of masonry of the cavity wall or the metal stud wall sheathing, behind insulation board.
  - 1. When using foamed-in-place insulation, cavity vapor retarder is not required, unless otherwise indicated.

### 3.13 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.
  - 1. Construct formwork to conform to shape, line, and dimensions shown. Verify the formwork is sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

- B. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
  - 1. Comply with requirements of ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

### 3.14 FULL BED MANUFACTURED BUILDING STONE VENEER INSTALLATION

- A. Cutting Full Bed Manufactured Building Stone Veneer: Cut units to length using a masonry splitter or similar means to provide clean-cut edge.
  - 1. Where exposed to view in wall, such as at corners and openings, dress split ends to match face by chiseling or similar methods.
  - 2. Clean, smooth edges shall not be exposed at outside corners, masonry openings, or similar conditions, unless required to receive adjoining construction, such as opening frames, or as otherwise indicated.
- B. Wetting Full Bed Manufactured Building Stone Veneer: When ambient air temperature exceeds 100 deg F, or exceeds 90 deg F with a wind velocity greater than 8 mph, pre-wet building stone units. Lay wetted units when surface is dry.
- C. Coursing: Place masonry to lines and levels indicated. Maintain courses to uniform width, with vertical and horizontal joints equal and of uniform thickness, 3/8-inch thick.
  - 1. Do not install full bed manufactured building stone veneer below grade; install onto underlying decorative concrete masonry unit coursing so that the bottom of stone veneer is between 2 and 4 inches above grade.
- D. Pattern: Lay building stone units in random bond pattern, consistent with pattern of approved mockup, using the following percentage ratio per size of units, from smallest to largest:
- E. Placing and Bonding:
  - 1. Lay units in full bed of mortar, properly jointed with other work. Buttering corners of joints and deep or excessive furrowing of joints are not permitted. Fully bond intersections and external corners.
  - 2. Do not adjust units after laying. Where resetting of units is required, remove and clean units, and then reset in new mortar.
  - 3. Install wall ties, anchorages, flashings, vents and other masonry accessories as described herein for other types of masonry veneers.
- F. Cleaning: Clean full bed manufactured building stone veneer by only using cleaners that are manufactured or approved by the masonry unit manufacturer. Carefully follow manufacturer's written instructions for cleaning methods.
  - 1. Use alternative cleaning solutions and methods for difficult-to-clean masonry surfaces only upon consultation with masonry unit manufacturer.

### 3.15 FIELD QUALITY CONTROL

- A. Owner shall engage a qualified independent testing agency to perform field quality-control testing. Contractor should be aware of the following standards that will be followed by the Owner's testing agency:
1. Testing Frequency: Tests and evaluations listed in this paragraph will be performed during construction for each 35,000 bricks or 5,700 concrete masonry units. Testing requirements for mortar and grout may be deleted if prism testing is retained.
  2. Mortar properties shall be tested per ASTM C 780.
  3. Grout shall be sampled and tested for compressive strength per ASTM C 1019.
  4. Prism-Test Method: For each type of structural masonry wall construction indicated, masonry prisms will be tested per ASTM C 1314, using 1 set of prisms for testing at 7 days and 1 set for testing at 28 days.
  5. Weep Tests: Allow masonry 12 hours setting time before testing. Tests shall be performed in 10-foot lengths of cavity.

### 3.16 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  3. Protect adjacent stone and non-masonry 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 cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
  5. Clean brick by the bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20, using job-mixed detergent solution.
  6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
  7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.

### 3.17 MASONRY WASTE DISPOSAL

- A. Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site in accordance with Division 1 Section "Construction Waste Management."

END OF SECTION 042000





## SECTION 051200 - STRUCTURAL STEEL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Structural steel.
- 2. Grout.

- B. Related Requirements:

- 1. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other steel items not defined as structural steel.
- 2. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" and Section 099600 "High-Performance Coatings" for surface-preparation and priming requirements.

#### 1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

#### 1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

D. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## 1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

C. Mill test reports for structural steel, including chemical and physical properties.

D. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Shop primers.
3. Nonshrink grout.

E. Survey of existing conditions.

F. Source quality-control reports.

G. Field quality-control reports.

## 1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A company specializing in the detailing and fabrication of the work of this section, with a minimum five (5) years of experience with projects of similar size and scope.

B. Installer Qualifications: A company specializing in the erection and assembling of the work of this section, with a minimum five (5) years of experience with projects of similar size and scope.

- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- D. Comply with applicable provisions of the following specifications and documents:
  - 1. AISC 303.
  - 2. AISC 341 and AISC 341s1.
  - 3. AISC 360.
  - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
  - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
  - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  - 2. Clean and lubricate bolts and nuts that become dry or rusty before use.
  - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.
  - 1. Select and complete connections using schematic details indicated and AISC 360.
  - 2. Use Load and Resistance Factor Design; data are given at factored-load level.

## 2.2 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
- B. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than the following:
  - 1. W-Shapes: 60 percent.
  - 2. Channels, Angles: 60 percent.
  - 3. Plate and Bar: 25 percent.
  - 4. Cold-Formed Hollow Structural Sections: 25 percent.
  - 5. All Other Steel Materials: 25 percent.
- C. W-Shapes: ASTM A 992/A 992M, Grade 50.
- D. Channels, Angles A 36/A 36M, Grade 36.
- E. Plate and Bar: ASTM A 36/A 36M, Grade 36.
- F. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50.
- G. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.
- H. Corrosion-Resisting, Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.
- I. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
- J. Steel Forgings: ASTM A 668/A 668M.
- K. Welding Electrodes: Comply with AWS requirements.

## 2.3 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
  - 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.
- B. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
  - 1. Finish: Hot-dip zinc coating.
  - 2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.

- C. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
  - 1. Configuration: Straight.
  - 2. Nuts: ASTM A 563 heavy-hex carbon steel.
  - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
  - 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
  - 5. Finish: Plain.
- D. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
  - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
  - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
  - 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
  - 4. Finish: Plain.
- E. Threaded Rods: ASTM A 36/A 36M.
  - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
  - 2. Washers: ASTM F 436, Type 1, hardened carbon steel.
  - 3. Finish: Plain.

## 2.4 PRIMER

- A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Primer: Comply with Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."
- C. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.
- D. Primer: SSPC-Paint 25 BCS, Type I, zinc oxide, alkyd, linseed oil primer.
- E. Primer: SSPC-Paint 23, latex primer.
- F. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- G. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

## 2.5 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## 2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
  - 1. Camber structural-steel members where indicated.
  - 2. Fabricate beams with rolling camber up.
  - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
  - 4. Mark and match-mark materials for field assembly.
  - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning."
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces.
  - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

## 2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

## 2.8 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  2. Surfaces to be field welded.
  3. Surfaces of high-strength bolted, slip-critical connections.
  4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
  5. Galvanized surfaces.
  6. Surfaces enclosed in interior construction.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 2, "Hand Tool Cleaning."
  2. SSPC-SP 3, "Power Tool Cleaning."
  3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
  4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
  5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
  6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
  8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
  9. SSPC-SP 8, "Pickling."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

## 2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
  2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

## 2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
  - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
- D. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
  - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
  - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.



- B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Weld plate washers to top of baseplate.
  - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

### 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
  - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
  - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

### 3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
  - 1. Verify structural-steel materials and inspect steel frame joint details.
  - 2. Verify weld materials and inspect welds.
  - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
  - 1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

### 3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- D. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION 051200

## SECTION 052100 - STEEL JOIST FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. K-series steel joists.
- 2. Joist accessories.

- B. Related Requirements:

- 1. Section 033000 "Cast-in-Place Concrete" for installing bearing plates in concrete.
- 2. Section 042000 "Unit Masonry" for installing bearing plates in unit masonry.

#### 1.3 DEFINITIONS

- A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product.

- B. Shop Drawings:

- 1. Include layout, designation, number, type, location, and spacing of joists.
- 2. Include joining and anchorage details, bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.
- 3. Indicate locations and details of bearing plates to be embedded in other construction.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.

- B. Welding certificates.
- C. Manufacturer certificates.
- D. Mill Certificates: For each type of bolt.
- E. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

## 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."
  - 1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
- B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

## 1.8 SEQUENCING

- A. Deliver steel bearing plates to be built into cast-in-place concrete and masonry construction.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.
  - 1. Use ASD; data are given at service-load level.
  - 2. Design special joists to withstand design loads with live-load deflections no greater than the following:
    - a. Floor Joists: Vertical deflection of 1/360 of the span.
    - b. Roof Joists: Vertical deflection of 1/360 of the span.

- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

## 2.2 K-SERIES STEEL JOISTS

- A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
  - 1. Joist Type: K-series steel joists and KCS-type K-series steel joists.
- B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.
- C. Provide holes in chord members for connecting and securing other construction to joists.
- D. Camber joists according to SJI's "Specifications."
- E. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

## 2.3 PRIMERS

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.
- B. Primer: Provide shop primer that complies with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

## 2.4 JOIST ACCESSORIES

- A. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.
- B. Fabricate steel bearing plates from ASTM A 36/A 36M steel with integral anchorages of sizes and thicknesses indicated.
- C. Steel bearing plates with integral anchorages are specified in Section 055000 "Metal Fabrications."
- D. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
  - 1. Finish: Plain, uncoated.
- E. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Plain.

F. Welding Electrodes: Comply with AWS standards.

G. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

## 2.5 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2.

B. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

C. Shop priming of joists and joist accessories is specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

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

### 3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.

2. Space, adjust, and align joists accurately in location before permanently fastening.

3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.

4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.

C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and

procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

- D. Bolt joists to supporting steel framework using carbon-steel bolts.
- E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with Research Council on Structural Connection's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

### 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.
- B. Visually inspect field welds according to AWS D1.1/D1.1M.
  - 1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M.
- C. Visually inspect bolted connections.
- D. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- E. Perform additional testing to determine compliance of corrected Work with specified requirements.

### 3.4 PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories.
  - 1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP 2, or power-tool cleaning according to SSPC-SP 3.
  - 2. Apply a compatible primer of same type as primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- D. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 052100



## SECTION 053100 - STEEL DECKING

### 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. Composite floor deck.
- B. Related Requirements:
  - 1. Section 033000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
  - 2. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.
  - 3. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
  - 4. Section 099113 "Exterior Painting" for repair painting of primed deck and finish painting of deck.
  - 5. Section 099123 "Interior Painting" for repair painting of primed deck and finish painting of deck.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings:
  - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of steel deck.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
  - 1. Power-actuated mechanical fasteners.

- D. Evaluation Reports: For steel deck.
- E. Field quality-control reports.

## 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. Electrical Raceway Units: Provide UL-labeled cellular floor-deck units complying with UL 209 and listed in UL's "Electrical Construction Equipment Directory" for use with standard header ducts and outlets for electrical distribution systems.
- D. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
  - 1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- D. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the

Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- E. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. ASC Profiles, Inc.
  2. Canam Steel Corp.;The Canam Manac Group.
  3. Consolidated Systems, Inc.
  4. DACS, Inc.
  5. D-Mac Industries Inc.
  6. Epic Metals Corporation.
  7. Marlyn Steel Decks, Inc.
  8. New Millennium Building Systems, LLC.
  9. Nucor Corp.; Vulcraft Division.
  10. Roof Deck, Inc.
  11. United Steel Deck, Inc.
  12. Valley Joist; Division of EBSCO Industries, Inc.
  13. Verco Manufacturing Co.
  14. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

## 2.2 COMPOSITE FLOOR DECK

- A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G30 zinc coating.
  2. Profile Depth: As indicated.
  3. Design Uncoated-Steel Thickness: 20 gage = 0.0358 inch.
  4. Span Condition: Triple span or more.

## 2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile indicated.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- J. Galvanizing Repair Paint: ASTM A 780.
- K. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
  - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions. Install mechanical fastener such that they do not penetrate cellular deck perforated flat-bottom plate.

### 3.3 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
  - 1. Weld Diameter: 5/8 inch, nominal.
  - 2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart, but not more than 18 inches apart.
  - 3. Weld Spacing: Space and locate welds as indicated.
  - 4. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches, and as follows:
  - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
  - 2. Mechanically clinch or button punch.
  - 3. Fasten with a minimum of 1-1/2-inch-long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
  - 1. End Joints: Lapped.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- F. Install piercing hanger tabs at 14 inches apart in both directions, within 9 inches of walls at ends, and not more than 12 inches from walls at sides unless otherwise indicated.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.

- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

### 3.5 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on top surface of prime-painted deck immediately after installation, and apply repair paint.
  - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
  - 2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- D. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

## SECTION 054000 - COLD-FORMED METAL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Floor joist framing.
2. Exterior non-load-bearing wall framing
3. Soffit framing.

- B. Related Requirements:

1. Section 092216 "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.

- B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

- C. Delegated-Design Submittal: For cold-formed steel framing.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.

- B. Welding certificates.

- C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.

1. Steel sheet.

2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

## 1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

D. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

1. ClarkDietrich Building Systems
2. Marino\WARE
3. Nuconsteel, A Nucor Company
4. Steel Network, Inc. (The)
5. Steel Structural Systems
6. United Steel Deck, Inc.



## 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer registered in the State that the project is located to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
  - 1. Design Loads: As indicated.
  - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
    - a. Floor Joist Framing: Vertical deflection of  $1/360$  for live loads and  $1/240$  for total loads of the span.
    - b. Exterior Non-Load-Bearing Framing: Horizontal deflection of  $1/360$  of the wall height.
    - c. Soffit Framing: Vertical deflection of  $1/360$  for total loads of the span.
  - 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
  - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
    - a. Upward and downward movement of  $1/2$  inch.
  - 5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Design Standards:
  - 1. Floor and Roof Systems: AISI S210.
  - 2. Wall Studs: AISI S211.
  - 3. Headers: AISI S212.
- D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

## 2.3 COLD-FORMED STEEL FRAMING, GENERAL

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: ST33H.
  - 2. Coating: G60.

## 2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0329 inch.
  - 2. Flange Width: 1-5/8 inches, minimum.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: Matching steel joists.
  - 2. Flange Width: 1-1/4 inches, minimum.
- C. Vertical Deflection Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0428 inch.
  - 2. Flange Width: 1 inch plus the design gap for one-story structures.

## 2.5 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0329 inch.
  - 2. Flange Width: 1-5/8 inches, minimum.
- B. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

## 2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
  - 1. Supplementary framing.

2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

## 2.7 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
- C. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
  1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- E. Welding Electrodes: Comply with AWS standards.

## 2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

## 2.9 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  - 1. Fabricate framing assemblies using jigs or templates.
  - 2. Cut framing members by sawing or shearing; do not torch cut.
  - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
  - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
  - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- C. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

### 3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
  - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
  - 1. Cut framing members by sawing or shearing; do not torch cut.
  - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place,

undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
  - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

#### 3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
  - 1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  - 1. Install single deep-leg deflection tracks and anchor to building structure.
  - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
  - 3. Connect vertical deflection clips to infill studs and anchor to building structure.
  - 4. Connect drift clips to cold-formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
  - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
    - a. Install solid blocking at centers indicated on Shop Drawings.

2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
  3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
  4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.5 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000





## SECTION 061000 - ROUGH CARPENTRY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Framing with dimension lumber.
  - 2. Sheathing.
  - 3. Wood blocking and nailers.
  - 4. Wood furring and grounds.
  - 5. Wood sleepers.
  - 6. Plywood backing panels.

#### 1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
  - 2. NLGA: National Lumber Grades Authority.
  - 3. RIS: Redwood Inspection Service.
  - 4. SPIB: The Southern Pine Inspection Bureau.
  - 5. WCLIB: West Coast Lumber Inspection Bureau.
  - 6. WWPA: Western Wood Products Association.

#### 1.4 ACTION 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 materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include

physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
  1. Wood-preservative-treated wood.
  2. Fire-retardant-treated wood.
  3. Power-driven fasteners.
  4. Powder-actuated fasteners.
  5. Expansion anchors.
  6. Metal framing anchors.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

## 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, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
  3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

## 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
  2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat all rough carpentry unless otherwise indicated:
1. Wood 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 floor plates that are installed over concrete slabs-on-grade.

## 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Use treatment that does not promote corrosion of metal fasteners.
  - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
  - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
  - 4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841. Where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings, and the following:
  - 1. Framing for raised platforms and/or stages.
  - 2. Concealed blocking.
  - 3. Plywood backing panels, behind finished wood veneer. Refer to Division 6 Section "Interior Architectural Woodwork."

## 2.4 DIMENSION LUMBER FRAMING

- A. Joists, Rafters, and Other Framing: Select Structural No. 1 grade.
  - 1. Species:

- a. Hem-fir (north); NLGA.
- b. Southern pine; SPIB.
- c. Douglas fir-larch; WCLIB or WWPA.
- d. Mixed southern pine; SPIB.
- e. Spruce-pine-fir; NLGA.
- f. Douglas fir-south; WWPA.
- g. Hem-fir; WCLIB or WWPA.
- h. Douglas fir-larch (north); NLGA.
- i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

## 2.5 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. Furring.
  - 5. Grounds.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.
- C. For concealed boards, provide lumber with 15 percent maximum moisture content.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

## 2.6 PLYWOOD SHEATHING

- A. Plywood Backing Panels
  - 1. Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.
    - a. Plywood shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Preservative-Treated Plywood

1. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  - a. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
3. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

C. Fire-Retardant-Treated Plywood

1. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
2. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - a. Use treatment that does not promote corrosion of metal fasteners.
  - b. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
  - c. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
  - d. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified.
3. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
4. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
5. Application: Treat plywood indicated on Drawings, including sheathing within 48 inches of fire walls.

## 2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153 or of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
  - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

## 2.8 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
  - 1. Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbonate, combined with an insecticide containing chlorpyrifos as its active ingredient.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Install plywood backing panels by fastening to masonry; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
  - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
  - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
  - 2. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill below partitions.
- H. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- I. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - 1. Use inorganic boron for items that are continuously protected from liquid water.
  - 2. Use copper naphthenate for items not continuously protected from liquid water.



- J. 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 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.
- K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- L. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
  - 1. Comply with approved indicated fastener patterns where applicable.
  - 2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

### 3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

### 3.3 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.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

## SECTION 072100 - THERMAL INSULATION

### 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. Extruded polystyrene foam-plastic board insulation.
2. Glass-fiber blanket insulation.
3. Mineral-wool blanket.
4. Vapor retarders.

- B. Related Sections:

1. Division 4 Section "Unit Masonry Assemblies," for insulation installed in cavity walls.
2. Division 7 Section "Composite Sheet Waterproofing," for insulated drainage panels installed with waterproofing.
3. Division 7 Section "Foamed-In-Place Insulation" for insulation applied to unit masonry assemblies and similar applications, as indicated.
4. Division 7 Section "Thermoplastic Polyolefin (TPO) Roofing," for insulation specified as part of roofing construction.
5. Division 7 Section "Firestop Systems," for insulation installed as part of a fire-resistive joint system.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design Submittals: Refer to Division 1 Section "LEED Requirements."

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

## 1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to 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 foam-plastic board insulation as follows:
  - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
  - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
  - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

## PART 2 - PRODUCTS

### 2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
  - 1. Thermal Properties: Minimum continuous R-Value of 5.0 per inch; 2-inch-thick shall be the equivalent of R-10.
  - 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. Dow Chemical Company (The).
    - b. DiversiFoam Products.
    - c. Owens Corning.
    - d. Pactiv Corporation.
  - 3. Foundation and Composite Sheet Waterproofing Insulation: Type IV, 25 psi; equal to Dow "Styrofoam Perimate." Includes insulation used in conjunction with below-grade, composite sheet waterproofing.
  - 4. Exterior Wall Cladding (non-preinsulated) Insulation (as specifically indicated): Type IV, 25 psi; equal to Dow "Styrofoam Scoreboard."
  - 5. Cavity Wall Insulation: Refer to Division 4 Section "Unit Masonry Assemblies."
  - 6. Roofing Insulation: Refer to Division 7 Section "Thermoplastic Polyolefin (TPO) Roofing" for polyisocyanurate board insulation.

7. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

## 2.2 GLASS-FIBER BLANKET INSULATION

- 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. CertainTeed Corporation.
  2. Guardian Building Products, Inc.
  3. Johns Manville.
  4. Owens Corning.
- B. Recycled Content: As indicated in Division 1 Section "LEED Requirements."
- C. Reinforced-Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.
- D. Thermal Properties: Minimum continuous R-Value of 3.2 per inch; 6-inch-thick shall be the equivalent of R-19.

## 2.3 MINERAL-WOOL BLANKETS

- 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. Roxul, Inc.
  2. Industrial Insulation Group, LLC (IIG-LLC).
  3. Thermafiber, Inc.; an Owens Corning company.
- B. Recycled Content: As indicated in Division 1 Section "LEED Requirements."
- C. Mineral-Wool Blanket, Unfaced: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
  1. For use in firestopping assemblies, as indicated.

## 2.4 VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.
- B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

- D. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.
- E. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.

## 2.5 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
  - 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. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
    - b. Gemco; Spindle Type.
  - 2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
  - 3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

## 2.6 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
  - 1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
  - 2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
- B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

## PART 3 - EXECUTION

### 3.1 PREPARATION

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

### 3.2 INSTALLATION, GENERAL

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

- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation 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. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

### 3.3 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit. Prepare panels for one of the following attachment methods.
- B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
  1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application.
  2. Apply insulation standoffs to each spindle to create cavity width indicated on Drawings between concrete substrate and insulation.
  3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
  4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
- C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

### 3.4 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical surfaces, including at composite sheet waterproofing assemblies, set insulation units using manufacturer's recommended adhesive or loosely laid according to manufacturer's written instructions.
  1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

### 3.5 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 4 Section "Unit Masonry Assemblies."

### 3.6 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- 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. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
  4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
  5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
    - a. Set units in exterior walls with facing placed toward interior of construction.
    - b. Set units in interior walls with facing placed toward areas of high humidity, unless otherwise indicated.
- D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
  1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
  2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

### 3.7 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

- A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
  1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to



insulation manufacturer's written instructions for insulation type, thickness, and application indicated.

2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

### 3.8 INSTALLATION OF VAPOR RETARDERS

- A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
  1. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
  2. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

### 3.9 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 072100



## SECTION 079200 - JOINT SEALANTS

### 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:

1. Exterior sealants.
2. Exterior and interior traffic sealants.
3. Interior sealants.
4. Interior food contact sealants.
5. Interior sanitary sealants.
6. Metal lap joint sealants.
7. Threshold and sheet metal bedding sealants.
8. Joint accessories.

- B. Related Sections include the following:

1. Division 4 Section "Unit Masonry Assemblies" for masonry control and expansion joint fillers and gaskets.
2. Division 7 Section "Firestop Systems" for fire-rated building joint-sealant, penetration sealant and head-of-wall sealant systems.
3. Division 8 Sections "General Glazing" and "Fire-Rated Glazing" for glazing sealants.
4. Division 9 Section "Gypsum Board" for sealing perimeter joints of gypsum board partitions to reduce sound transmission and for control joint fillers.
5. Division 9 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.
6. Division 32 Section "Concrete Paving Joint Sealants" for sealants to be used in sidewalks, curbing, plazas and similar exterior concrete paving.

#### 1.3 SUBMITTALS

- A. Shop Drawing:

1. Submit a Sealant Schedule, and related details, indicating specific installation and interface between sealants and building materials for each type of joint sealant and joint backing material used in this specification. Use SAME reference designations as

indicated in this Specification for preparation of the Joint Sealant Schedule in Paragraph 3.6. Submittals are subject to the requirements of Division 1 Section "Submittals."

- B. Product Data: For each joint-sealant product indicated.
- C. Samples: Submit standard **cured** color samples and charts for each sealant type illustrating full range of standard and custom colors.
- D. Manufacturer's Certificate:
  - 1. Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
  - 2. For manufacturer's products that include the phrase, "but are not limited to the following," the Contractor shall be responsible to provide certification that the submittal product complies with the specified product. This certification is subject to the requirements of Division 1 Section "Submittals," Part 1, Definitions.
- E. Qualifications Data:
  - 1. For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified. Provide SWRI (Sealant, Waterproofing and Restoration Institute) Validation Certificate.
- F. Compatibility and Adhesion from sealant manufacturer indicating the following:
  - 1. Building materials forming joint and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
  - 3. Preconstruction Compatibility and Adhesion Field Test for each sealant and building material.
- G. Sustainable Design Submittals: Refer to Division 1 Section "LEED Requirements."

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:
  - 1. Submit recommended inspection intervals.
  - 2. Submit instructions for repairing and replacing failed sealed joints.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project. Provide SWRI (Sealant, Waterproofing and Restoration Institute) Validation Certificate.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.
- D. Preinstallation Conference: Conduct conference at Project site.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants or other causes.

## 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
  - 2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.
  - 3. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

## 1.8 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in

addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
  - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
  - 2. Disintegration of joint substrates from natural causes exceeding design specifications.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience for the following sealant types:
  - 1. Multi-component sealants cure by chemical reaction. Cure times are predictable depending on atmospheric temperature. Silicone sealant cure is not affected by temperature, however, frost and moisture at bond line will impair adhesion.
  - 2. Single component sealants cure by reaction with moisture. Cure times will vary depending on atmospheric humidity and temperature.
  - 3. Fast cure (FC) sealants provide lesser cure times than corresponding standard cure products. Longer cure times will permit more accumulation of dust and other air-borne contamination on surface of sealant, potentially causing apparent color change.
  - 4. Sealant Types are M – Multi-Component and S – Single Component.
  - 5. Sealant Grades are P – Pourable or Self-Leveling used for horizontal traffic joints and NS – Non-Sag or Gunnable used for vertical and non-traffic joints.
  - 6. Sealant Classes are 25, 50, and 100/50 (extension/compression) representing movement capability in percent of joint width. Joint movement is based on the relative percentage of installed width. Design to a minimum of 4 times anticipated movement to accommodate design tolerances and expected movement based on coefficient of thermal expansion.
  - 7. Sealant Uses are T – Traffic, NT – Non-Traffic, I – Immersion, M – Mortar, A – Aluminum, and O – Other. Use O includes color anodized aluminum, metals other than aluminum, painted surfaces, brick, stone, tile, and wood for example.
  - 8. Immersion rated sealant applications require primer.

- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Architectural Sealants: 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
  - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food; provide products that comply with 21 CFR 177.2600.
- E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range of standard and custom colors.

2.2 URETHANE SEALANT TYPES – For exterior or interior use:

- A. **U1** - Multi-Component, Non-Sag, Urethane: ASTM C920, Type M, Grade NS, Class 50; Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Pecora Corporation; Dynatrol II.
  - 2. Polymeric Systems, Inc.; PSI-270.
  - 3. Tremco, Inc.; Dymeric 240 FC.
- B. **U2** - Multi-Component, Traffic-Grade Urethane: ASTM C920, Type M, Grade NS, Class 50; Uses T, Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
  - 1. Polymeric Systems, Inc.; PSI-270.
  - 2. Tremco, Inc.; Dymeric 240 FC.
- C. **U3** - Single-Component, Non-Sag Urethane: ASTM C920, Type S, Grade NS, Class 100/50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Sika Corporation, Construction Products Division; Sikaflex-15LM.
  - 2. Tremco, Inc.; Dymonic FC.
- D. **U4** - Single-Component, Non-Sag Urethane: ASTM C920, Type S, Grade NS, Class 25, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Pecora Corporation; Dynatrol I-XL.
  - 2. Sika Corporation, Construction Products Division; Sikaflex-1a.

3. Tremco, Inc.; Dymonic or Fulkem 116.
- E. **U5** - Single-Component, Pourable, Traffic-Grade Urethane: ASTM C920, Type S, Grade P, Class 25, Uses T. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Pecora Corporation; Urexpan NR-201.
  2. Tremco, Inc; Vulkem 45SSL.
  3. Sika Corporation, Construction Products Division; Sikaflex-1CSL.
- F. **U6** - Immersible, Single Component, Pourable, Traffic-Grade Urethane: ASTM C 920, Type S, Grade P, Class 25, Uses T and I. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:
1. Sika Corporation, Construction Products Division; Sikaflex-1CSL.
  2. Tremco, Inc.; Vulkem 45 SSL.
- G. **U7** - Immersible, Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C920. Type M, Grade P, Class 25, for Use T and I. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. LymTal International, Inc.; Iso-Flex 880GB.
  2. May National Associates, Inc.; Bondaflex PUR 2 SL.
  3. Tremco, Inc.; Vulkem 245.

2.3 SILICONE SEALANT TYPES – For exterior or interior use:

- A. **S1** - Single-Component, Non-Staining, Non-Sag, Neutral-Curing Silicone: ASTM C920, Type S, Grade NS, Class 50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to the following:
1. Dow Corning Corporation; 756SMS, 791, 795 or 995.
  2. Tremco, Inc.; Spectrem 3.
  3. Pecora Corporation; 864, 895 or 898.
- B. **S2** - Single Component, Non-Sag, Neutral-Curing Silicone: ASTM C920, Type S, Grade NS, Class 100/50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:
1. Dow Corning Corporation; 790.
  2. Pecora Corporation; 301NS, 311NS.
  3. Tremco, Inc.; Spectrem 1.
- C. **S3** - Single Component, Non-Sag, Neutral-Curing Silicone: ASTM C920, Type S, Grade NS, Class 50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:
1. Dow Corning Corporation; 791, 795 or 995.



2. Pecora Corporation; 864, 895 or 898.
3. Tremco, Inc.; Spectrem 2, Proglaze SSG.

D. **S-4** - Single Component, Field-Tintable, Non-Sag, Neutral-Curing Silicone: ASTM C920, Type S, Grade NS, Class 50, Uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

- a. Pecora Corporation; 890 FTS.
- b. Tremco, Inc.; Spectrem 4TS.

E. **S5** - Mildew-resistant, Single Component, Acid-Curing Silicone: ASTM C920, Type S, Grade NS, Class 25, uses NT. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. BASF Building Systems; Omnipus.
2. Dow Corning Corporation; 786 Mildew Resistant.
3. Tremco, Inc.; Tremsil 200 Sanitary.

#### 2.4 LATEX SEALANT TYPES – For Interior Use Only:

A. **L1** – Acrylic Latex or Siliconized Acrylic Latex, ASTM C834, Type OP, Grade NF. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. BASF Building Systems; Sonolac.
2. Pecora Corporation; AC-20+.
3. Tremco, Inc.; Tremflex 834.

B. **L2** - Acoustical Joint Sealant for Exposed and Concealed Joints: ASTM C1311 Manufacturer’s standard Non-sag, paintable, no staining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Tremco, Inc.; Acoustical Sealant.
2. Pecora Corporation; AC-20 FTR, AIS-919.
3. USG Corporation; SHEETROCK Acoustical Sealant.

#### 2.5 SOLVENT-RELEASE-CURING-JOINT SEALANTS:

A. **B1** - Butyl-Rubber-Based Joint Sealant: ASTM C 1311. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

1. Tremco, Inc.; Tremco Butyl Sealant.
2. Bostik, Inc.; Chem-Calk 300.

3. Pecora Corporation; BC-158.

2.6 PREFORMED JOINT SEALANTS – For exterior or interior applications per manufacturer’s standards:

- A. **PF1** - Preformed Silicone Joint Sealants: Manufacturer’s standard sealant consisting of procured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:
  1. Dow Corning Corporation; 123 Silicone Seal.
  2. Pecora Corporation; Sil-Span.
  3. Tremco, Inc.; Simple Seal.
  
- B. **PF2** - Preformed Foam Joint Sealant: Manufacturer’s standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu.ft. impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:
  1. Tremco, Inc.; illbruk illmod 600.
  2. EMSEAL Joint Systems, Ltd.; Emseal 25V.
  3. School International, Inc.; Sealtite, Sealtite 50N.

2.7 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; 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. Cylindrical Sealant Backings: ASATM C 1330, of type indicated below and size and density to control sealant depth and otherwise contribute to producing optimum sealant performance, paired to the sealant type. List the type on the Sealant Schedule.
  1. **Type C:** Closed-cell material with a surface skin.
  2. **Type O:** Open-cell material.
    - a. Bostik, Inc.
    - b. Pecora Corporation
    - c. Tremco, Inc.

## 2.8 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant back materials, free of oil residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## 2.9 EXISTING WORK

- A. Mechanically remove existing sealant.
- B. Clean joint surfaces of residual sealant and other contaminants capable of affecting sealant bond to joint surface.
- C. Allow joint surfaces to dry before installing new sealants.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.  
Remove loose particles remaining from

above cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include, but are not limited to, the following:

- a. Concrete.
  - b. Masonry.
  - c. Unglazed surfaces of ceramic tile.
3. Remove laitance and form-release agents from concrete.
  4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous surfaces include, but are not limited to, the following:
    - a. Metal.
    - b. Glass.
    - c. Porcelain enamel.
    - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that 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 SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  1. Do not leave gaps between ends of sealant backings.
  2. Do not stretch, twist, puncture, or tear sealant backings.
  3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

- E. Install sealants using proven techniques to comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
  2. Completely fill recesses in each joint configuration.
  3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
  2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
  4. Provide flush joint profile where indicated per Figure 8B in ASTM C1193.
  5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
    - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
  2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch. Hold edge of sealant bead ¼ inch inside masking tape.
  3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
  4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.
- H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.
- I. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

### 3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants 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 joint sealants immediately so installations with repaired areas are indistinguishable from original work.

### 3.6 JOINT-SEALANT SCHEDULE

Sealant types should be selected from the available listed products in Part 2 of this specification section. These sealants shall be indicated on the submittal schedule, using the same reference designation as indicated in Part 1.3.A. of this Section.

- A. Exterior or Interior Sealant Joints:

- 1. Applications:

- a. Control and expansion joints in cast-in-place concrete.
- b. Joints between precast concrete units.
- c. Control and expansion joints in unit masonry.
- d. Butt joints between metal panels.
- e. Joints between different materials listed above.
- f. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
- g. Control and expansion joints in soffits and overhead surfaces.

- 2. Other exterior joints in vertical surfaces and non-traffic horizontal surfaces for which no other sealant is specified

- B. Interior Food Contact Sealant Joints:

- 1. Applications:

- a. Joints in kitchen counter tops and work surfaces.
- b. Joints between food service equipment and surrounding construction.
- c. Other interior joints where incidental food contact may occur.

- C. Interior Sanitary Sealant Joints:

1. Applications:
  - a. Joints in toilet room and bathroom counter tops.
  - b. Joints between plumbing fixtures and adjacent materials.
  - c. Joints between locker room lockers and adjacent materials.
  - d. Joints between food service equipment and surrounding construction.
  - e. Other interior joints in wet areas where needed to limit mold and mildew growth.

D. Metal Lap and Bedding Sealant Joints:

1. Applications:
  - a. Concealed lap and hook joints in sheet metal flashing and trim.
  - b. Bedding joints under metal thresholds and saddles.
  - c. Bedding joints between sheet metal flashing and other materials.

E. Preformed Joint Sealants:

1. Applications:
  - a. Control and expansion joints in cast-in-place concrete.
  - b. Joints between precast concrete units.
  - c. Control and expansion joints in unit masonry.
  - d. Butt joints between metal panels.
  - e. Joints between different materials listed above.
  - f. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
  - g. Control and expansion joints in soffits and overhead surfaces.
  - h. Other exterior joints in vertical surfaces and non-traffic horizontal surfaces for which no other sealant is specified.

END OF SECTION 079200





## 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. This Section includes standard and fire-rated hollow metal doors and frames.
- B. Related Sections:
  - 1. Division 4 Section "Unit Masonry Assemblies" for embedding anchors for hollow metal work into masonry construction.
  - 2. Division 8 Section "Flush Wood Doors" for wood doors to be secured to hollow metal frames.
  - 3. Division 8 Sections "General Glazing" for glass view panels installed in hollow metal frames and doors.
  - 4. Division 8 Section "Door Hardware" for door hardware for hollow metal doors.
  - 5. Division 9 Painting Sections 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 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance and temperature-rise ratings, and finishes.
- B. Door hardware supplier shall furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:

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.
2. Elevations of each door design.
3. Details of doors, including vertical and horizontal edge details and metal thicknesses.
4. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
5. Locations of reinforcement and preparations for hardware.
6. Details of each different wall opening condition.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.
10. Details of conduit and preparations for power, signal, and control systems.

- D. Door Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using **SAME** reference designations for details and openings as those on Drawings. Coordinate with final Door Schedule.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.
- B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies, if applicable.

#### 1.7 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 non-vented 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- high wood blocking. Do not store in a manner that traps excess humidity. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

#### 1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

## 1.9 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete and masonry inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

## 1.10 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.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.
- B. 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. Steelcraft; an Allegion company.
  - 2. Amweld Building Products, LLC.
  - 3. CECO Door Products; an ASSA ABLOY Group company.
  - 4. Curries Company; an ASSA ABLOY Group company.

### 2.2 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - 1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
  - 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.
- B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and 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 or UL 9. Label each individual glazed lite.

- C. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

## 2.3 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- C. Frame Anchors: ASTM A 591, Commercial Steel (CS), 40Z coating designation; mill phosphatized. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 or ASTM A 1011, hot-dip galvanized according to ASTM A 153, Class B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.
- E. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.
- F. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143.
- G. Glazing: Comply with requirements in Division 8 Sections "General Glazing" and "Fire Rated Glazing."
- H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.4 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness 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; full flush door edges with continuous laser weld.
  - 2. Core Construction: As follows:
    - a. Standard Interior Doors: Manufacturer's standard honeycomb core.
    - b. Fire Doors: Manufacturer's standard honeycomb core, or as required to provide fire-protection and temperature-rise ratings indicated.
    - c. Exterior Doors: 1.8 lb/cu. ft. density polyurethane core, laminated to both face sheets with contact adhesive; capable of carrying the following minimum thermal-resistance properties:
      - 1) ASTM C 518, Calculated: 10.0 R-Value; 0.10 U-Factor.
      - 2) ASTM C 1363, Operable: 2.9 R-Value; 0.35 U-Factor.

3. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth.
    - a. Vertical Edges for Single-Acting Doors: Beveled edge; 1/8 inch in 2 inches.
    - b. Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
  4. Top and Bottom Edges: Closed with inverted 15-gauge-thick minimum end closures or channels of same material as face sheets, extending full width of the door and welded to face sheet.
  5. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. 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 2 (18 gauge) and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).
  - C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. 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 (16 gauge) and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush).
  - D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
    1. Hinge Reinforcement: Minimum 7 gauge plate, 1-1/4 inch x 9 inches, or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
  - E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.
- 2.5 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 sheet.
    1. Fabricate frames with mitered or coped corners, face-welded unless otherwise indicated.
    2. Frames for Level 2 Steel Doors: 16-gauge-thick steel sheet.
  - C. Interior Frames: Fabricated from cold-rolled steel sheet; provide metallic-coated steel sheet where specifically 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, Wood Doors and Borrowed Lights: 16-gauge-thick steel sheet.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

## 2.6 FRAME ANCHORS

### A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 19 gauge thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 7 gauge thick.
2. Stud-Wall Type: Designed to engage steel stud, welded to back of frames; not less than 19 gauge thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

- B. Floor Anchors: Provided at each jamb, formed from A60 metallic-coated material, minimum 19-gauge-thick.

## 2.7 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 22-gauge-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 high unless otherwise indicated.
- C. Loose Stops for Glazed Lites in Frames: Minimum 22-gauge-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, minimum 8-gauge-thick.
- C. Metal Louvers: Door and frame manufacturer's standard metal louvers, unless otherwise indicated.
1. Blade Type: Vision proof, inverted V or Y shape.

2. Metal and Finish: Galvanized steel, minimum 20-gauge-thick, factory-primed for factory-painted, powder-coated finish. Match pre-finished door and frame paint color, where applicable.
3. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 90 minutes and less; meet fire rating as indicated.

## 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 SDI 117.
- C. Hollow Metal Doors:
  1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
  2. Glazed Lites: Factory-cut openings in doors.
  3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
- 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.
  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. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
  5. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      - 1) Two anchors per jamb up to 60 inches high.
      - 2) Three anchors per jamb from 60 to 90 inches high.
      - 3) Four anchors per jamb from 90 to 120 inches high.
      - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
    - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

- 1) Three anchors per jamb up to 60 inches high.
  - 2) Four anchors per jamb from 60 to 90 inches high.
  - 3) Five anchors per jamb from 90 to 96 inches high.
  - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
  - 5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
- c. Compression Type: Not less than two anchors in each jamb.
  - d. Post-installed Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
    - 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 8 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 non-templated, mortised and surface-mounted door hardware. Provide minimum 14-gauge closer reinforcement.
  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.
- G. Electrified Hardware Coordination: Factory-weld 18 gauge electrical knockout boxes to frame for electrical hardware preparation, including, but not limited to, through-wire transfer hardware, raceways and wiring harnesses, door position switches, electric strikes, magnetic locks and jamb-mounted card readers, as specified in the hardware sets per Division 8 Section "Door Hardware" and Division 26 through 28 Electrical Sections.
1. Provide electrical knockout boxes with dual 1/2-inch and 3/4-inch knockouts.
  2. Conduit shall be coordinated and installed in the field from middle hinge box and strike box, and strike box to door position box.
  3. Electrical knockout boxes shall comply with NFPA requirements and accommodate electrical door hardware, per door hardware set requirements.
  4. Electrical knockout boxes for continuous hinges shall be located in the center of vertical dimension on hinge jamb.
- H. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.



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 each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
6. Glazing: Comply with requirements in Division 8 Sections "General Glazing" and "Fire-Rated Glazing" and with hollow metal door manufacturer's written instructions.

## 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.
- B. Factory Finishes: Where indicated, factory-apply electrostatic paint finish to doors and frames in accordance with ANSI A250.3 test procedure acceptance criteria for steel doors, frames and accessories.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  1. General Contractor shall verify the accuracy of all dimensions indicated for existing openings in which new hollow metal frames and doors are scheduled to be installed, as well as existing frames scheduled to remain and accommodate new doors and/or hardware. Verify existing frame conditions to include, but not be limited to, locations of strikes and hinges and hinge backsets, for new hardware provisions.
- 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, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive non-templated, 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 anti-freezing agents.
  - 2. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
  - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

4. In-Place Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  5. In-Place Gypsum Board Partitions: Secure frames in place with post-installed expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  6. 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, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch, 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 plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
  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 8 Sections "General Glazing" and "Fire-Rated Glazing" and with hollow metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly, between 2 inches o.c. and 9 inches o.c. from each corner.

### 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 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Solid-core doors with wood-veneer faces.
  - 2. Factory finishing flush wood doors.
  - 3. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Sections include the following:
  - 1. Division 8 Section "Door Hardware" for door hardware requirements.
  - 2. Division 8 Section "General Glazing" for glass view panels in flush wood doors.
  - 3. Division 8 Section "Fire-Rated Glazing" for glass view panels in fire-rated flush wood doors.
  - 4. Division 8 Section "Hollow Metal Doors and Frames" for metal frames for wood doors.
  - 5. Divisions 26 through 28 Electrical Sections for power wiring and low voltage requirements for electrified hardware.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of door. 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. Details of doors, including vertical and horizontal edge details.
  - 3. Indicate dimensions and locations of cutouts.
  - 4. Indicate doors to be factory finished and finish requirements.
  - 5. Indicate fire ratings for fire doors.
  - 6. Indicate preparations for power, signal, and control systems.

- C. Door Schedule: Use **SAME** reference designations indicated on Drawings in preparing schedule for doors and frames.
- D. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:
  - 1. Faces of Factory-Finished Doors: Show the full range of colors available for stained finishes.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Quality Standard: Comply with WDMA Architectural Woodwork Quality Standards Illustrated.
  - 1. Provide WDMA Quality Certification Labels or a WDMA letter of licensing for Project indicating that doors comply with requirements of grades specified.
  - 2. When requested, provide evidence that the installer has successful experience completing projects of similar scope and with products as specified herein.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

#### 1.6 PROJECT CONDITIONS

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

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist), or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
  - a. Solid-Core Interior Doors: Life of installation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Basis of Design Product – Aspiro Series by Masonite Architectural (includes Marshfield-Algoma, Graham, Mohawk and Maiman). Subject to compliance with requirements, the following manufacturers’ products may also be incorporated into the Work:
  1. Flush Wood Doors:
    - a. VT Industries/Eggers.
    - b. Lambton.
- B. Manufacturers other than those listed above will not be accepted – No substitutions will be allowed.

### 2.2 DOOR CONSTRUCTION, GENERAL

- A. Doors for Transparent Finish:
  1. Grade: Premium, with Grade A faces.
  2. Species and Cut: Maple, plain sliced with full range of stain to be selected by architect.
  3. Veneer flitch match: Book match, running match.
  4. Pair Match: Provide for doors hung in same opening or separated only by mullions.
  5. Stiles: Same species as faces.

### 2.3 SOLID-CORE DOORS

- A. Particleboard Cores: Comply with the following requirements:
  1. Particleboard: ANSI A208.1, Grade LD-2, 32 lb. density.
  2. Blocking: Provide solid wood blocking in particleboard-core doors for installation of hardware.
- B. Interior Veneer-Faced Doors:
  1. Core: Particleboard.

2. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed and then veneered or laminated in a one-step hot press method.

C. Fire-Rated Doors:

1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as needed to provide fire rating indicated.
2. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated for installation of hardware.
  - a. Doors with exit devices provide top rail, bottom rail and 5 x 10 right and left lock blocks.
3. Edge Construction: At hinge stiles, provide manufacturer's standard veneer-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.
  - a. At locations where new doors are being retrofitted into existing frames, provide lumber edge doors to all for minor field fitting.
4. Pairs: Furnish formed-steel edges and astragals with intumescent seals for pairs of fire-rated doors, unless otherwise indicated.
  - a. Finish steel edges and astragals with baked enamel.
5. Pairs with Surface Mounted Panic Devices: Provide fire-rated pairs with fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals.
6. Intumescent Seals For Fire Rated Doors: Category "A" doors with manufacturer's standard concealed intumescent seals.

## 2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors:

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.
3. At 20-minute, fire-rated, wood-core doors, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings in Fire Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire rating indicated. Include concealed metal glazing clips where required for opening size and fire rating indicated.



- C. Metal Louvers: Where doors are indicated in the Door Schedule to receive louvers, provide the following:
  - 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. Air Louvers, Inc.; a division of the Activar Construction Products Group.
    - b. Anemostat Products; a Mestek company.
    - c. L & L Louvers, Inc.
    - d. Louvers & Dampers, Inc.; a division of Mestek, Inc.
    - e. McGill Architectural Products.
  - 2. Blade Type: Vision-proof, inverted Y or V.
  - 3. Metal and Finish: Cold-rolled steel, 18-gauge frames with 22-gauge blades, factory-finished. Color to be selected by Architect from manufacturer's full range of available colors.

## 2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
  - 1. Comply with clearance requirements of referenced quality standard for fitting. 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 measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
  - 2. Metal Astragals: Pre-machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
  - 1. Light and Louver Openings: Trim openings with moldings of material and profile indicated.

## 2.6 FACTORY FINISHING

- A. General: Comply with WDMA Architectural Woodwork Quality Standards Illustrated for factory finishing.
- B. Finish doors at factory.

- C. Transparent Finish:
  - 1. Grade: Premium.
  - 2. Finish: WDMA System TR-6 catalyzed polyurethane, or UV cured polyurethane.
  - 3. Staining: To be selected by Architect from manufacturer's full range of stain colors.
  - 4. Effect: Open-grain finish.
  - 5. Sheen: Satin.

## 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, and replace at no cost to Owner.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Hardware: For installation, see Division 8 Section "Door Hardware."
- B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
  - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

### 3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

## SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

### 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. Exterior and interior storefront framing.
- 2. Exterior and interior manual-swing entrance doors and door-frame units.

- B. Related Requirements:

- 1. Division 7 Section "Joint Sealants" for joint sealants installed as part of aluminum entrance and storefront systems.
- 2. Division 8 Section "Door Hardware" for hardware preparations required for aluminum entrance and storefront systems.
- 3. Division 8 Section "General Glazing" for insulated and non-insulated glazing assemblies to be installed in aluminum-framed storefront framing and doors.
- 4. Division 8 Section "Glazed Aluminum Curtain Walls" for exterior sun shades installed onto aluminum storefront framing.
- 5. Divisions 26 through 28 Electrical Sections for power wiring and low voltage requirements for electrified hardware.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
  - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.

2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
    - a. Joinery, including concealed welds.
    - b. Anchorage.
    - c. Expansion provisions.
    - d. Glazing.
    - e. Flashing and drainage.
  3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- D. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
1. Joinery, including concealed welds.
  2. Anchorage.
  3. Expansion provisions.
  4. Glazing.
  5. Flashing and drainage.
- E. Entrance Door Hardware Schedule: As indicated in Division 8 Section "Door Hardware." Prepare doors and frames for approved, prescribed hardware in the factory to the greatest extent possible.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Preconstruction Laboratory Mockup Testing Submittals:
1. Testing Program: Developed specifically for Project.
  2. Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.
  3. Record Drawings: As-built drawings of preconstruction laboratory mockups showing changes made during preconstruction laboratory mockup testing.
- B. Qualification Data: For Installer.
- C. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
- D. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.

- E. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.
- F. Source quality-control reports.
- G. Field quality-control reports.
- H. Sample Warranties: For special warranties.

## 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.
- B. Maintenance Data for Structural Sealant: For structural-sealant-glazed storefront to include in maintenance manuals. Include ASTM C 1401 recommendations for post-installation-phase quality-control program.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
  - 1. Engineering Responsibility: Prepare data for entrance and storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

## 1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.

- c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Water penetration through fixed glazing and framing areas.
    - e. Failure of operating components.
  2. Warranty Period: Two years from date of Substantial Completion.
  3. Aluminum Entrances: Door corners of heavy-walled entrances shall have a limited lifetime warranty.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  1. Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  2. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Division 1 Section "Quality Requirements," to design aluminum-framed entrances and storefronts.
- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- C. Structural Loads: Wind Load criteria shall be as indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
  2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
    - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
  3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
    - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.
- E. Structural: Test according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
  2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
1. Fixed Framing and Glass Area: Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
  2. Entrance Doors:
    - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
    - b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
- G. Water Penetration under Static Pressure: Test according to ASTM E 331, with no evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
- H. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
  2. Maximum Water Leakage: According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

- I. Energy Performance: Certify and label energy performance according to AAMA 507 and 1503 and NFRC 100 as follows:
  - 1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.36 Btu/sq. ft. x h x deg F (using  $U_{cog}=0.29$ ), according to NFRC 100.
  - 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 as determined according to NFRC 200.
  - 3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 45 as determined according to NFRC 500.
  
- J. Noise Reduction: Test according to AAMA 1801 and ASTM E 90, with ratings determined by ASTM E 1332, as follows:
  - 1. Sound Transmission Class: Not less than 32 for 1-inch insulated glazing and 36 for laminated glazing.
  - 2. Outdoor-Indoor Transmission Class: Not less than 27 for 1-inch insulated glazing and 30 for laminated glazing.
  
- K. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
  - 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
    - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
    - b. Low Exterior Ambient-Air Temperature: 0 deg F.
    - c. Interior Ambient-Air Temperature: 75 deg F.
  
- L. Structural-Sealant Joints:
  - 1. Designed to carry gravity loads of glazing.
  - 2. Designed to produce tensile or shear stress of less than 20 psi.
  
- M. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed storefront system without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
  - 1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
  - 2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.



## 2.2 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer North America; an Alcoa Company “Trifab VG 451T” (thermal) and “Trifab VG 451” (non-thermal), or comparable products by one of the following:
1. EFCO Corporation.
  2. TRACO.
  3. Tubelite.
  4. Vistawall Architectural Products; The Vistawall Group; a BlueScope Steel company.
  5. YKK AP America, Inc.
- B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront systems as well as glazed aluminum curtain wall systems, including operable units and accessories, from same manufacturer.

## 2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads and operable components, including swinging doors.
1. Thermal Barrier (Exterior Assemblies): Compliant with AAMA TIR-A8 and tested in accordance with AAMA 505; thermally broken system using manufacturer's standard 1/4-inch separation, consisting of a two-part, chemically-cured, high-density polyurethane or similar material; mechanically and adhesively joined to aluminum sections.
  2. Glazing System: Retained mechanically with gaskets on four sides.
  3. Glazing Plane: Center, with ability to be glazed from the interior or exterior.
  4. Finish: Full range of manufacturer colors.
  5. Fabrication Method: Screw spline, shear block or field-fabricated stick system.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum or zinc-plated steel with nonstaining, nonferrous shims for aligning system components.
- D. Fasteners: Zinc-plated steel concealed fasteners; hardened aluminum alloys or AISI 300-series nonmagnetic, nonstaining stainless steel fasteners where exposed.
- E. Accessories: 0.050-inch aluminum sill flashing end dams; 3-point attachment system.
- F. Materials:
1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
    - a. Sheet and Plate: ASTM B 209; 5005-H14 aluminum alloy, 0.050-inch thick.

- b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
  - c. Extruded Structural Pipe and Tubes: ASTM B 429.
  - d. Structural Profiles: ASTM B 308.
2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
- a. Structural Shapes, Plates, and Bars: ASTM A 36.
  - b. Cold-Rolled Sheet and Strip: ASTM A 1008.
  - c. Hot-Rolled Sheet and Strip: ASTM A 1011.
- G. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 450 or less.

## 2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard and heavy glazed entrance doors and flush aluminum entrance doors for manual-swing operation. Provide the following types of doors, as indicated on the Drawings:
- 1. Standard Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded
    - a. Basis of Design: Equal to Kawneer "500 Standard Entrance" swing doors.
    - b. Door Design: Wide stile; 5-inch nominal width for vertical stiles and top rails; 10-inch nominal width for bottom rails; 6-inch nominal width for intermediate rails.
      - 1) Verify stile and rail dimensions indicated for entrance doors will properly accommodate and conceal prescribed hardware components, including, but not limited to, exit devices and closers. Report any discrepancies to the Architect.
    - c. Glazing Stops and Gaskets: Square or beveled, snap-on, extruded-aluminum stops and preformed gaskets.
      - 1) Provide non-removable glazing stops on outside of door.
  - 2. Heavy-Walled Entrance Doors: Heavy duty glazed entrance doors for high-traffic applications. Adjoining framing members shall be of same aluminum thickness at connection points and of profile required to accommodate door thickness.
    - a. Basis of Design: Equal to Kawneer "500 Heavy Wall" swing doors.

- b. Door Construction: 2-inch overall depth, with minimum 0.1875 (3/16) -inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet weld. Doors shall be designed and constructed to resist both lever arm and torsion forces, as intended for high-traffic applications.
  - 1) Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
  - 2) Door Design: Wide stile; 5-inch nominal width for vertical stiles and top rails; 10-inch nominal width for bottom rails; 6-inch nominal width for intermediate rails.
    - a) Verify stile and rail dimensions indicated for entrance doors will properly accommodate and conceal prescribed hardware components, including, but not limited to, exit devices and closers. Report any discrepancies to the Architect.
  - 3) Glazing Stops and Gaskets: Square or beveled profile, snap-on, minimum 0.050-inch-thick extruded-aluminum stops and preformed gaskets, of EPDM or thermoplastic elastomeric extrusions.
    - a) Provide nonremovable glazing stops on outside of door.
- 3. Flush Entrance Doors: Flush-style doors with aluminum sheet facing applied to backer board on both interior and exterior surfaces.
  - a. Basis of Design: Equal to Kawneer “Flushline Entrances.”
  - b. Construction: Minimum 0.125-inch-thick tubular stile and rail framing system, with mechanically-fastened mitered corners with reinforcing brackets and 3/8-inch-diameter, full-width galvanized steel tie rods; internal reinforcing for hardware attachment.
  - c. Thermal Performance: Poured-in-place, 5 lb/sq. ft. polyurethane core, interlocked with framing components.
  - d. Facing: Minimum 0.062-inch-thick aluminum sheet, bonded to manufacturer’s standard hardboard backer on interior and exterior faces of door; facing sheets shall be terminated with integral extruded reglets. Fiberglass-reinforced polyester (FRP), acrylic modified polyester (AMP) or other facing materials are not acceptable.
    - 1) Texture: Smooth; embossed texture is not acceptable.
    - 2) Finish: full range of manufacturer colors.
  - e. Vision Lites: Provide narrow lite or half lite openings where indicated; mechanically-fastened with low-profile aluminum perimeter trim with mitered corners, designed to accommodate glazing type as scheduled.

## 2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Division 8 Section "Door Hardware."
- B. Weather Stripping: Manufacturer's standard replaceable components.
  - 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
  - 2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

## 2.6 GLAZING

- A. Glazing, including glazing gaskets and glazing sealants: Comply with Division 8 Section "General Glazing."

## 2.7 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  - 2. Reinforce members as required to receive fastener threads.
  - 3. Use exposed fasteners with countersunk Phillips screw heads, fabricated from 300 series stainless steel.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
  - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

## 2.8 FABRICATION

- A. Form or extrude aluminum shapes before finishing.

- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
  - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- F. Storefront Framing: Fabricate components for assembly using shear-block system.
- G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
  - 1. At exterior doors, provide compression weather stripping at fixed stops.
  - 2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
  - 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
  - 2. At exterior doors, provide weather sweeps applied to door bottoms.
- I. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.9 ALUMINUM FINISHES

- A. Class I, Clear Anodized Finish: AA-M10C22A44 (Mechanical Finish: as fabricated; Chemical finish: etched, medium matter; Anodic Coating: Architectural Class I, clear coating 0.7 mils or thicker) complying with AAMA 611.

1. Color: Clear Anodized, as selected by Architect from manufacturer's full range. Color must match glazed aluminum curtain wall framing. Color shall also match various types of sheet metal flashing and trim, excluding specialty wood grain patterns, to the greatest extent possible.
  - 2.
- B. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

### 3.3 INSTALLATION

- A. General:
  1. Comply with manufacturer's written instructions.
  2. Do not install damaged components.
  3. Fit joints to produce hairline joints free of burrs and distortion.
  4. Rigidly secure nonmovement joints.
  5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
  6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
  1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
  2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" to produce weathertight installation.

- D. Install components plumb and true in alignment with established lines and grades.
- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Install glazing as specified in Division 8 Section "General Glazing."
- G. Install weatherseal sealant according to Division 7 Section "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
  - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
  - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

### 3.4 ERECTION TOLERANCES

- A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
  - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
  - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
  - 3. Alignment:
    - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
  - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

### 3.5 ADJUSTING AND CLEANING

- A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.
- B. Remove excess sealant and glazing compounds, and dirt from surfaces.

### 3.6 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 084113



## SECTION 084123 - FIRE RATED WINDOW ASSEMBLY

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Fire rated framing systems for installation as full vision lights in windows for exterior openings.
- B. Related Sections include the following:
- C. Related Sections:
  - 1. Section 051200 "Structural Steel Framing:" Steel attachment members
  - 2. Section 055000 "Metal Fabrications:" Steel attachment members inserts and anchors
  - 3. Section 076200 "Sheet Metal Flashing and Trim" Flashing between this work and other work
  - 4. Section 078413 Fire Stop Systems between work of this section and other fire resistive assemblies.

#### 1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA)
  - 1. AAMA 501.1-2005: Standard Test Method for Water Penetration of Windows, Curtain Walls, and Doors Using Dynamic Pressure
  - 2. AAMA 501.2-2003: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems
  - 3. AAMA 501.5-2005: Test Method for Thermal Cycling of Exterior Walls
  - 4. AAMA 1503-1998: Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections
  - 5. AAMA 2603-2002 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
  - 6. AAMA 2604-2005 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
  - 7. AAMA 2605-2005 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- B. American Society for Testing and Materials (ASTM):
  - 1. Fire safety related:
    - a. ASTM E2074-00: Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.

2. Material related
    - a. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2007.
    - b. ASTM A 1011/A 1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2006b.
  3. Exterior related
    - a. ASTM E 283-04: Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen
    - b. ASTM E 330-02: Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference Procedure A
    - c. ASTM E 331-04: Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
    - d. ASTM E 783-02: Test Method for Field Measurement of Air Leakage through Installed Exterior Windows and Doors
    - e. ASTM E 1105-00: Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference
  4. Sound related:
    - a. ASTM E 90-04: Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
    - b. ASTM E 413-04: Standard Classification for Rating Sound Insulation
- C. American Welding Society (AWS)
1. AWS D1.3 - Structural Welding Code - Sheet Steel; 2007
- D. Builders Hardware Manufacturers Association, Inc.
1. BHMA A156 - American National Standards for door hardware; 2006 (ANSI/BHMA A156).
- E. National Fire Protection Association (NFPA):
1. NFPA 80: Standard for Fire Doors and Fire Windows.
  2. NFPA 251: Standard Methods of Tests of Fire Endurance of Building Construction and Materials.
  3. NFPA 252: Standard Methods of Fire Tests of Door Assemblies.
  4. NFPA 257: Standard on Fire Test for Window and Glass Block Assemblies.
- F. Underwriters Laboratories, Inc. (UL):
1. UL 9: Fire Tests of Window Assemblies.
  2. UL 10B: Fire Tests of Door Assemblies.
  3. UL 10C: Positive Pressure Fire Tests of Door Assemblies.
- G. American National Standards Institute (ANSI):

1. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings.

H. Consumer Product Safety Commission (CPSC):

1. CPSC 16 CFR 1201 Categories I and II: Safety Standard for Architectural Glazing Materials.

### 1.3 DEFINITIONS

A. Manufacturer: A firm that produces primary glass, fabricated glass or framing as defined in referenced glazing publications.

### 1.4 SUBMITTALS

A. Submit in accordance with Section 013300.

B. Product Data:

1. Technical Information: Submit latest edition of manufacturer's product data providing product descriptions, technical data, Underwriters Laboratories, Inc. listings and installation instructions.

C. Shop Drawings:

1. Include plans, elevations and details of product showing component dimensions; framed opening requirements, dimensions, tolerances, and attachment to structure

D. Glazing Schedule: Use same designations indicated on drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

E. Warranties: Submit manufacturer's warranty.

F. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements.

1. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

### 1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to

1. International Accreditation Service for a Type A Third-Party Inspection Body (Field Services ICC-ES Third-Party Inspections Standard Operating Procedures, 00-BL-S0400 and S0401)

2. International Accreditation Service for Testing Body-Building Materials and Systems

a. Fire Testing

1) ASTM Standards E 119

2) CPSC Standards 16 CFR 1201

3) NFPA Standards 251, 252, 257

- 4) UL Standards 9, 10B, 10C, 1784, UL Subject 63
- 5) BS 476; Part 22: 1987
- 6) EN 1634-1
- 7) CAN Standards S 101, S 104, S 106

- B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).
- C. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Source Limitations for Glazing Accessories: Obtain framing system, glazing and glazing accessories from one source for each product and installation method indicated.
- E. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are classified and labeled by UL, for fire ratings indicated, based on testing according to NFPA 257. Assemblies must be factory-welded or come complete with factory-installed mechanical joints and must not require job site fabrication.
- F. Listings and Labels - Fire Rated Assemblies: Under current follow-up service by Underwriters Laboratories® maintaining a current listing or certification. Label assemblies accordance with limits of manufacturer's listing.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle under provisions specified by manufacturer.
  1. At delivery inspect all containers for damage.
  2. Examine glass and frame units for damage.
  3. List all damage to containers on the shipping company's Bill of Lading
  4. Report damage to manufacturer immediately.
  5. Store glazing materials and frame units in original packing containers
  6. Do not expose glazing material of frame units to sunlight and weather.
  7. Do not store horizontally.
  8. Place glass and frames upright, no less than 6 degrees from vertical.
  9. Store all materials in dry conditions, off the ground.
  10. Protect from construction activities.
  11. Fully support glass units along entire length
  12. Glass and frame units must be separated by non-abrasive pads such as cloth or cork.
  13. Do not stack containers

## 1.7 PROJECT CONDITIONS

- A. Obtain field measurements prior to fabrication of frame units. If field measurements will not be available in a timely manner coordinate planned measurements with the work of other sections.
  - 1. Note whether field or planned dimensions were used in the creation of the shop drawings.
- B. Coordinate the work of this section with others effected including but not limited to: other interior and/or exterior envelope components and door hardware beyond that provided by this section

## 1.8 WARRANTY

- A. Provide the Fireframes® Designer Series standard five-year manufacturer warranty.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS - FIRE RATED EXTERIOR WINDOW

- A. Glass Material: FireLite® NT fire-rated glazing with air space and ¼” low e-glass for insulated glass unit for exterior window application as fabricated and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 (800-426-0279) fax (800-451-9857) e-mail [sales@fireglass.com](mailto:sales@fireglass.com), web site <http://www.fireglass.com>.
- B. Frame System: “Fireframes® Designer Series by TGP” fire-rated brushed stainless steel with 45 minute rating frame system as manufactured and supplied by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 (800-426-0279) fax (800-451-9857) e-mail [sales@fireglass.com](mailto:sales@fireglass.com) web site <http://www.fireglass.com>.
- C. Equals: Allowed as meeting “Basis of Design” performance requirements including Safti-First.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire Rating Requirements
  - 1. Duration-- Window Assembly: Capable of providing a fire rating for 45 minutes.
  - 2. Duration--Opening Applications in fire partitions or area separation walls and corridors where opening protection is specified: Capable of providing 45 minute rating.
- B. Delegated design: For the performance requirements listed below requiring structural design provide data, calculations and drawings signed and sealed by an engineer licensed in the state where the project is located.
- C. Design Requirements:
  - 1. Dimensions -- Window Assembly:
    - a. Perimeter framing face dimension: 2 3/4-inch at head, sill and jamb.
    - b. Horizontal and/or vertical mullions: 3 9/16-inch on the face.
    - c. Depth of perimeter and mullion: 1 15/16-inch.

2. Construction: Narrow-profile, roll-formed steel architectural grade specialty fire doors. Conventional break-shape type hollow metal steel fire-rated doors will not be considered an acceptable substitute for the Fireframes Designer Series doors specified in this section as they do not conform to the project design intent and/or aesthetic and quality standards.
  - a. Knock down frames are not permitted.

D. Structural Performance

1. Design and size the system to withstand structural forces placed upon it without damage or permanent set when tested in accordance with ASTM E330 using load 1.5 times the design wind loads and of 10 seconds in duration.
2. Positive wind load: as indicated on the drawings
3. Negative wind Load: as indicated on the drawings
4. Member deflection: Limit deflection of the edge of the glass normal to the plane of the glass to flexure limit of glass 1/175 of the glass edge length or ¼ inch, whichever is less of any framing member
5. Accommodate movement between storefront and adjoining systems

- E. Air infiltration: Provide systems that allow a maximum air leakage through fixed glazed openings of 0.06 cfm/sq. ft. of area when tested per ASTM E 283 at a static air differential of [1.57] [6.24] lbf/sq ft

F. Water Penetration

1. Under Static pressure, provide systems that do not show uncontrolled water leakage when tested according to ASTM E 331 under static pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
2. Under Dynamic pressure, provide systems that do not show uncontrolled water leakage when tested according to AAMA 501.1 under static pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

## 2.3 MATERIALS - GLASS

- A. Fire Rated Glazing: ASTM C 1036 and ASTM C 1048; ceramic glazing material.
- B. Thickness of Glazing Material: 3/16" Premium Grade FireLite® NT (45 minutes) for interior pane with ¼" Low E Glass for exterior glass and air space to create insulated glazing unit for exterior application.
- C. Approximate Visible Transmission: Varies with thickness (approximate range 88 percent).
- D. Logo: Each piece of fire-rated glazing shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory (UL® only), fire rating period, safety glazing standards, and date of manufacture.
- E. Performance: Glass must be rated to stop fire from either direction and must meet all testing requirements including the required hose-stream test (where fire-rating exceeds 20 minutes).

## 2.4 MATERIALS – STEEL FRAMES

- A. Steel Framing System including 45 minute rated windows.
  - 1. Frame: brushed stainless steel, 45 minute rating profiled formed tubing.
  - 2. Fasteners: As recommended by manufacturer
  - 3. Glazing Accessories: calcium silicate setting blocks.
  - 4. Glazing Compounds:
    - a. FireLite® NT, Approved closed cell PVC tape, Fibrefrax, or pure silicone sealant.

## 2.5 FABRICATION

- A. Furnish frame assemblies pre-welded.
  - 1. When necessary, splice frames too large for shop fabrication or shipping or to fit in available building openings.
  - 2. Fit with suitable fasteners.
  - 3. Knock-down frames are not permitted
- B. Furnish interior frame assemblies “K-D”
  - 1. When necessary, splice frames too large for shop fabrication or shipping or to fit in available building openings.
  - 2. Fit with suitable fasteners.
  - 3. Knock-down door perimeter frames are not permitted
- C. Field glaze door and frame assemblies.
- D. Factory prepare steel door assemblies and install all hardware.
- E. Fabrication Dimensions: Fabricate to fire-rated field dimensions.
- F. Obtain approved shop drawings prior to fabrication.

## 2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish frames after assembly.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.

## 2.7 FACTORY FINISHES

- A. Color-Coated Finish: Apply manufacturer's standard powder coating finish system complying with AAMA 2603 applied to factory-assembled frames before shipping, complying with manufacturer's written instructions for surface preparation including pretreatment, application, and minimum dry film thickness.

1. Color and Gloss: Class 1 Dark Bronze 40 Anodized Finish to match exterior storefront, curtainwall and window systems, see specification 084113 & 084413.

## 2.8 ACCESSORY MATERIALS

- A. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and members to which the work of this section attaches or adjoins prior to frame installation.
- B. Provide openings plumb, square and within allowable tolerances.
  1. Provide 3/8 inch shim space at all walls
- C. Notify Architect of any conditions which jeopardize the integrity of the proposed fire wall / door system.
- D. Do not proceed until such conditions are corrected.

### 3.2 INSTALLATION

- A. Follow manufacturer's written instructions and approved shop drawings.
- B. Install fully welded fire window in strict accordance with the approved shop drawings.
- C. Install fire safing / fire stopping at edges of system
- D. Install glazing in strict accordance with fire rated glazing material manufacturer's specifications.
  1. Field cutting or tampering is not permissible.
- E. Do not install damaged frames or chipped glazing units.
- F. Install plumb and true. Limit out of plumb or true to 1/8 inch in 10'-0" in any dimension.

### 3.3 REPAIR AND TOUCH UP

- A. Limited to minor repair of small scratches. Use only manufacturer's recommended products.
  1. Such repairs shall match original finish for quality or material and view.
- B. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged.



### 3.4 ADJUSTING

- A. Adjust door function and hardware for smooth operation. Coordinate with other hardware suppliers for function and use of any other attached hardware.

### 3.5 PROTECTION AND CLEANING

- A. Protect glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
  - 1. Do not clean with astringent cleaners. Use a clean "grit free" cloth and a small amount of mild soap and water or mild detergent.
  - 2. Do not use any of the following:
    - a. Steam jets
    - b. Abrasives
    - c. Strong acidic or alkaline detergents, or surface-reactive agents
    - d. Detergents not recommended in writing by the manufacturer
    - e. Do not use any detergent above 77 degrees F
    - f. Organic solvents including but not limited to those containing ester, ketones, alcohols, aromatic compounds, glycol ether, or halogenated hydrocarbons.
    - g. Metal or hard parts of cleaning equipment must not touch the glass surface
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION 084123



## SECTION 084413 - GLAZED ALUMINUM CURTAIN WALLS

### 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. This Section includes glazed aluminum curtain walls and accessories, including exterior sun shades.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 7 Section "Joint Sealants" for joint sealants installed as part of glazed aluminum curtain wall system.
  - 2. Division 8 Section "General Glazing" for insulated glass assemblies to be installed in glazed aluminum curtain walls.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
  - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
  - 2. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
    - a. Joinery, including concealed welds.
    - b. Anchorage.
    - c. Expansion provisions.
    - d. Glazing.
    - e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- D. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
  1. Joinery, including concealed welds.
  2. Anchorage.
  3. Expansion provisions.
  4. Glazing.
  5. Flashing and drainage.
- E. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Preconstruction Laboratory Mockup Testing Submittals:
  1. Testing Program: Developed specifically for Project.
  2. Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.
  3. Record Drawings: As-built drawings of preconstruction laboratory mockups showing changes made during preconstruction laboratory mockup testing.
- B. Qualification Data: For Installer.
- C. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.
  1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.
- D. Product Test Reports: For glazed aluminum curtain walls, for tests performed by manufacturer and witnessed by a qualified testing agency.
- E. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.
- F. Source quality-control reports.
- G. Field quality-control reports.
- H. Sample Warranties: For special warranties.

## 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.
- B. Maintenance Data for Structural Sealant: For structural-sealant-glazed curtain walls to include in maintenance manuals. Include ASTM C 1401 recommendations for post-installation-phase quality-control program.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

## 1.8 WARRANTY

- A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Water penetration through fixed glazing and framing areas.
    - e. Failure of operating components.
  - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Division 1 Section "Quality Requirements," to design glazed aluminum curtain walls.
- B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- C. Structural Loads: Wind Loads as indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:
  1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
  2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
  3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
    - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4-inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.
- E. Structural: Test according to ASTM E 330 as follows:
  1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
  2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
1. Fixed Framing and Glass Area: Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
- G. Water Penetration under Static Pressure: Test according to ASTM E 331, with no evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
- H. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
  2. Maximum Water Leakage: According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- I. Interstory Drift: Accommodate design displacement of adjacent stories indicated.
1. Design Displacement: As indicated on Drawings.
  2. Test Performance: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement.
- J. Energy Performance: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
  2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 as determined according to NFRC 200.
  3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 45 as determined according to NFRC 500.
- K. Noise Reduction: Test according to ASTM E 90, with ratings determined by ASTM E 1332, as follows:
1. Sound Transmission Class: Not less than 32 for 1-inch insulated glazing and 36 for laminated glazing.
  2. Outdoor-Indoor Transmission Class: Not less than 27 for 1-inch insulated glazing and 30 for laminated glazing.
- L. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
  2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

- a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
- b. Low Exterior Ambient-Air Temperature: 0 deg F.
- c. Interior Ambient-Air Temperature: 75 deg F.

M. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.
2. Designed to produce tensile or shear stress of less than 20 psi.

N. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed curtain walls without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

## 2.2 MANUFACTURERS

- A. Source Limitations: Obtain all components of glazed aluminum curtain wall as well as aluminum-framed entrance and storefronts, including operable units and accessories, from same manufacturer.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide YKK AP America, Inc. "YCW 752" or comparable product by one of the following:
  1. EFCO Corporation.
  2. TRACO.
  3. Tubelite.
  4. Vistawall Architectural Products; The Vistawall Group; a BlueScope Steel company.
  5. YKK AP America, Inc.
  6. Kawneer

## 2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  1. Construction: Thermally broken.
  2. Glazing System: Retained mechanically with gaskets on four sides.
  3. Glazing Plane: Front.
  4. Finish: Full range of manufacturer colors.
  5. Fabrication Method: Factory- or field-fabricated shear block system.



- B. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing. Include snap-on aluminum trim that conceals fasteners.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Materials:
  - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
    - a. Sheet and Plate: ASTM B 209.
    - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
    - c. Extruded Structural Pipe and Tubes: ASTM B 429.
    - d. Structural Profiles: ASTM B 308.
  - 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
    - a. Structural Shapes, Plates, and Bars: ASTM A 36.
    - b. Cold-Rolled Sheet and Strip: ASTM A 1008.
    - c. Hot-Rolled Sheet and Strip: ASTM A 1011.

## 2.4 ENTRANCES

- A. Entrances: Where occurs, comply with Division 8 Section "Aluminum-Framed Entrances and Storefronts."

## 2.5 GLAZING

- A. Glazing and Glazing Sealants: Comply with Division 8 Section "General Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant and weatherseal-sealant curtain-wall manufacturers for this use. Color shall match structural sealant.

## 2.6 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, non-bleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  2. Reinforce members as required to receive fastener threads.
  3. Use exposed fasteners with countersunk Phillips screw heads, fabricated from 300 series stainless steel.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, non-bleeding flashing compatible with adjacent materials.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

## 2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
  2. Accurately fitted joints with ends coped or mitered.
  3. Physical and thermal isolation of glazing from framing members.
  4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  5. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
  6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Fabricate components to resist water penetration with one of the following methods:
1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
  2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.

- E. Curtain-Wall Framing: Fabricate components for assembly using manufacturer's standard shear-block system method.
- F. Factory-Assembled Frame Units:
  - 1. Rigidly secure nonmovement joints.
  - 2. Prepare surfaces that are in contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion.
  - 3. Preparation includes, but is not limited to, cleaning and priming surfaces.
  - 4. Seal joints watertight unless otherwise indicated.
  - 5. Install glazing to comply with requirements in Division 8 Section "General Glazing."
- G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.8 ALUMINUM FINISHES

- A. Class I, Clear Anodized Finish: AA-M10C22A44 (Mechanical Finish: as fabricated; Chemical finish: etched, medium matter; Anodic Coating: Architectural Class I, clear coating 0.7 mils or thicker) complying with AAMA 611.
  - 1. Color: Clear Anodized, as selected by Architect from manufacturer's full range. Color must match glazed aluminum curtain wall framing. Color shall also match various types of sheet metal flashing and trim, excluding specialty wood grain patterns, to the greatest extent possible.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

### 3.3 INSTALLATION

- A. General:
  - 1. Comply with manufacturer's written instructions.
  - 2. Do not install damaged components.

3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
7. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum is in contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

D. Install components plumb and true in alignment with established lines and grades.

E. Install glazing as specified in Division 8 Section "General Glazing." Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

F. Install weatherseal sealant according to Division 7 Section "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

### 3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:
  - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
  - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
  - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.5 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure glazed aluminum curtain wall system is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 084413



## SECTION 087100 - DOOR HARDWARE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Electromechanical door hardware.
  - 3. Cylinders specified for doors in other sections.
- C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  - 2. ICC/IBC - International Building Code.
  - 3. NFPA 70 - National Electrical Code.
  - 4. NFPA 80 - Fire Doors and Windows.
  - 5. NFPA 101 - Life Safety Code.
  - 6. NFPA 105 - Installation of Smoke Door Assemblies.
  - 7. State Building Codes, Local Amendments.
- D. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
  - 1. ANSI/BHMA Certified Product Standards - A156 Series.
  - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
  - 3. UL 305 - Panic Hardware.

#### 1.2 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
  - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door

hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each door hardware item.
    - b. Manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - e. Explanation of abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for door hardware.
    - g. Door and frame sizes and materials.
    - h. Warranty information for each product.
  4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
    - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
    - b. Complete (risers, point-to-point) access control system block wiring diagrams.
    - c. Wiring instructions for each electronic component scheduled herein.
  2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- E. Informational Submittals:
1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.



### 1.3 QUALITY ASSURANCE

- A. **Manufacturers Qualifications:** Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. **Certified Products:** Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. **Installer Qualifications:** A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. **Door Hardware Supplier Qualifications:** Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. **Source Limitations:** Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
  - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
  - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
- G. **Keying Conference:** Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
  - 1. Function of building, purpose of each area and degree of security required.
  - 2. Plans for existing and future key system expansion.
  - 3. Requirements for key control storage and software.
  - 4. Installation of permanent keys, cylinder cores and software.
  - 5. Address and requirements for delivery of keys.
- H. **Pre-Submittal Conference:** Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
  2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
  3. Review sequence of operation narratives for each unique access controlled opening.
  4. Review and finalize construction schedule and verify availability of materials.
  5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

#### 1.5 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

## 1.6 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of the hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
  - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.
  - 1. Permanent cylinders, cores, and keys to be installed by Owner.
- D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

## 2.2 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.
    - c. Four Hinges: For doors with heights 91 to 120 inches.
    - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
  2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    - a. Widths up to 3'6": 4-1/2" standard or heavy weight as specified.
    - b. Sizes from 3'7" to 4'0": 5" standard or heavy weight as specified.
  3. Manufacturers:
    - a. McKinney (MK) - TA/T4A Series, 5-knuckle.

## 2.3 CONTINUOUS HINGES

- A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
1. Manufacturers:
    - a. Pemko (PE).
- B. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 pin and barrel continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves, concealed stainless pin, and twin self-lubricated nylon bearings at each knuckle separation. Factory trim hinges to suit door height and prepare for electrical cut-outs.
1. Manufacturers:
    - a. Markar Products; ASSA ABLOY Architectural Door Accessories (MR).

## 2.4 POWER TRANSFER DEVICES

- A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
1. Manufacturers:
    - a. Securitron (SU) - EL-CEPT Series.
- B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug

directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Manufacturers:
  - a. McKinney (MK) - QC-C Series.

## 2.5 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
  1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
  2. Furnish dust proof strikes for bottom bolts.
  3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
  4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
  5. Manufacturers:
    - a. Rockwood (RO).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
  1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
  2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
  3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
  4. Pulls, where applicable, shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
  5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
  6. Manufacturers:
    - a. Rockwood (RO).

## 2.6 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
1. Threaded mortise cylinders with rings and cams to suit hardware application.
  2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
  4. Tubular deadlocks and other auxiliary locks.
  5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
  6. Keyway: Manufacturer's Standard.
- C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.
1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
  2. Manufacturers:
    - a. Corbin Russwin (RU) - Access 3 AP.
    - b. No Substitution.
- E. Keying System: Each type of lock and cylinders to be factory keyed.
1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
  2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
  3. Existing System: Field verify and key cylinders to match Owner's existing system.
- F. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Two (2)
  2. Master Keys (per Master Key Level/Group): Five (5).
  3. Construction Keys (where required): Ten (10).
  4. Construction Control Keys (where required): Two (2).
- G. Construction Keying: Provide temporary keyed construction cores.
- H. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
  2. Provide transcript list in writing or electronic file as directed by the Owner.

## 2.7 CYLINDRICAL LOCKS AND LATCHING DEVICES

- A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.
  - 1. Manufacturers:
    - a. Corbin Russwin Hardware (RU) - CLX3300 Series.
    - b. No Substitution.

## 2.8 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
  - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
  - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
  - 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
- B. Standards: Comply with the following:
  - 1. Strikes for Bored Locks and Latches: BHMA A156.2.
  - 2. Dustproof Strikes: BHMA A156.16.

## 2.9 ELECTRIC STRIKES

- A. Standard Electric Strikes: Electric strikes conforming to ANSI/BHMA A156.31, Grade 1, for use on non-rated or fire rated openings. Strikes shall be of stainless steel construction tested to a minimum of 1500 pounds of static strength and 70 foot-pounds of dynamic strength with a minimum endurance of 1 million operating cycles. Provide strikes with 12 or 24 VDC capability, fail-secure unless otherwise specified. Where specified provide latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike.
  - 1. Manufacturers:
    - a. HES (HS) - 1500/1600 Series.
- B. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

## 2.10 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
  - 1. Exit devices shall have a five-year warranty.
  - 2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as

- required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
  4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
  5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
  6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
  7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
  8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
  9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
  10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
  11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.
1. Electromechanical exit devices shall have the following functions and features:
    - a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
    - b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
    - c. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.
    - d. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.
    - e. Five-year limited warranty for electromechanical features.
  2. Manufacturers:
    - a. Sargent Manufacturing (SA) - 80 Series.
    - b. No Substitution.



## 2.11 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
  2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
  3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
  4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Heavy duty surface mounted door closers shall have a 30-year warranty.
  2. Manufacturers:
    - a. Norton Rixson (NO) - 7500 Series.
    - b. No Substitution.

## 2.12 ARCHITECTURAL TRIM

- A. Door Protective Trim
1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
  2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
  3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
  - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
  - a. Rockwood (RO).

#### 2.13 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
  1. Manufacturers:
    - a. Rockwood (RO).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
  1. Manufacturers:
    - a. Norton Rixson (RF).

#### 2.14 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
  1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- E. Manufacturers:
  1. Pemko (PE).

#### 2.15 ELECTRONIC ACCESSORIES

- A. Intelligent Switching Power Supplies: Provide power supplies with single, dual or multi-voltage configurations at 12 and/or 24VDC. Power Supply shall have battery backup function with an integrated battery charging circuit. The power supply shall have a standard, integrated Fire Alarm Interface (FAI). The power supply shall provide capability for secondary voltage, power distribution, direct lock control and network monitoring through add on modules. The power supply shall be expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs. Network modules shall provide remote monitoring functions such as status reporting, fault reporting and information logging.
  1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
  2. Manufacturers:
    - a. Securitron (SU) - AQL Series.

#### 2.16 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

#### 2.17 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### 3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

### 3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
  - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

### 3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

### 3.5 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

### 3.6 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

### 3.7 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
  1. Quantities listed are for each pair of doors, or for each single door.
  2. The supplier is responsible for handing and sizing all products.
  3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
  4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.
- B. Manufacturer's Abbreviations:
  1. MK - McKinney

- 2. PE - Pemko
- 3. SU - Securitron
- 4. RO - Rockwood
- 5. RU - Corbin Russwin
- 6. SA - SARGENT
- 7. HS - HES
- 8. RF - Rixson
- 9. NO - Norton
- 10. OT - Other

**Hardware Sets**

**Set: 1.0**

Doors: 204, 206

1	Continuous Hinge	CFM__HD1 - DOOR HEIGHT		PE
1	Classroom Intruder Lock	CLX3352 NZD CT6D	626	RU
2	Cylinder Core	CR8500	626	RU
1	Surface Closer	R7500	689	NO
1	Kick Plate	K1050 10" CSK BEV	US32D	RO
1	Wall Stop	403	US26D	RO
1	Gasketing (head/jamb)	S88BL		PE

Notes:

- Coordinate new hardware requirements with existing conditions. Provide new blank plates, filler plates and/or custom strike plates as required.

**Set: 2.0**

Doors: 205

1	Continuous Hinge	CFM__HD1 - DOOR HEIGHT		PE
1	Classroom Intruder Lock	CLX3352 NZD CT6D	626	RU
2	Cylinder Core	CR8500	626	RU
1	Surf Overhead Stop	10-X36	652	RF
1	Surface Closer	R7500	689	NO
1	Kick Plate	K1050 10" CSK BEV	US32D	RO
1	Gasketing (head/jamb)	S88BL		PE

Notes:

- Coordinate new hardware requirements with existing conditions. Provide new blank plates, filler plates and/or custom strike plates as required.

**Set: 3.0**

Doors: 100

1	Continuous Hinge	X25M__C-1100 - DOOR HEIGHT		PE
1	Continuous Hinge	X25M__C-1100 PT - DOOR HEIGHT		PE
1	Electric Power Transfer	EL-CEPT	630	SU
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Mortise Exit Device, Storeroom	LC 16 55 56 8904 ETL	US32D	SA
2	Mortise Cylinder	CR1580 CT6R - LENGTH/CAM TO SUIT	630	RU
2	Cylinder Core	CR8500	626	RU
1	Drop Plate (PA)	7788	689	NO
1	Blade Stop Spacer	6891	689	NO
1	Door Closer	CPS7500	689	NO
1	Door Stop (HD floor)	471	US26D	RO
1	Rain Guard	346C		PE
1	Perimeter/Mtg Stile Seal	BY FRAME / DOOR SUPPLIER		OT
2	Sweep (w/drip edge)	3452CNB		PE
1	Threshold	279x292AFGPK MSES25SS		PE
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C___ - LENGTH TO SUIT		MK
1	Card Reader	BY SECURITY		OT
2	Door Position Switch	BY SECURITY		OT
1	Power Supply	AQL4-R8E1		SU

Notes:

- Electronic Operation: Valid card retracts latchbolt; key retracts latchbolt. Free egress at all times. In case of power loss or fire alarm (if rated), door remains locked and latched.

**Set: 4.0**

Doors: 100A

2	Continuous Hinge	CFM__HD1 PT - DOOR HEIGHT		PE
2	Electric Power Transfer	EL-CEPT	630	SU

1	CVR Exit Device, Exit Only	55 AD8610 EO	US32D	SA
1	CVR Exit Device, Storeroom	LC 16 55 56 AD8606 ETL	US32D	SA
1	Rim Cylinder	CR3580 CT6R	630	RU
1	Mortise Cylinder	CR1580 CT6R - LENGTH/CAM TO SUIT	630	RU
2	Cylinder Core	CR8500	626	RU
2	Drop Plate (PA)	7788	689	NO
2	Blade Stop Spacer	6891	689	NO
2	Door Closer	CPS7500	689	NO
1	Perimeter/Mtg Stile Seal	BY FRAME / DOOR SUPPLIER		OT
2	Frame Harness	QC-C1500P		MK
2	Door Harness	QC-C___ - LENGTH TO SUIT		MK
1	Card Reader	BY SECURITY		OT
2	Door Position Switch	BY SECURITY		OT
1	Power Supply	AQL4-R8E1		SU

Notes:

- Electronic Operation: Valid card retracts latchbolt; key retracts latchbolt. Free egress at all times. In case of power loss or fire alarm (if rated), door remains locked and latched.

**Set: 5.0**

Doors: 113

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	CLX3357 NZD CT6R	626	RU
1	Cylinder Core	CR8500	626	RU
1	Bridge Rectifier	2005M3		HS
1	Electric Strike	1500C	630	HS
1	Surface Closer	PR7500	689	NO
1	Kick Plate	K1050 10" CSK BEV	US32D	RO
1	Wall Stop	403	US26D	RO
3	Silencer (HM / WD)	608 (or) 609		RO
1	Card Reader	BY SECURITY		OT
1	Door Position Switch	BY SECURITY		OT
1	Motion Sensor (REX)	BY SECURITY		OT
1	Lock / Strike Power	BY SECURITY		OT

Notes:

- Electronic Operation: Valid card releases electric strike; key retracts latchbolt. Free egress at all times. In case of power loss or fire alarm (if rated), door remains locked and latched.



**Set: 6.0**

Doors: 105A

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	CLX3357 NZD CT6R	626	RU
1	Cylinder Core	CR8500	626	RU
1	Bridge Rectifier	2005M3		HS
1	Electric Strike	1500C	630	HS
1	Door Closer	CLP7500	689	NO
1	Kick Plate	K1050 10" CSK BEV	US32D	RO
1	Gasketing (head/jamb)	S88BL		PE
1	Card Reader	BY SECURITY		OT
1	Door Position Switch	BY SECURITY		OT
1	Motion Sensor (REX)	BY SECURITY		OT
1	Lock / Strike Power	BY SECURITY		OT

Notes:

- Connect power supply to fire alarm system, if rated.
- Electronic Operation: Valid card releases electric strike; key retracts latchbolt. Free egress at all times. In case of power loss or fire alarm (if rated), door remains locked and latched.

**Set: 7.0**

Doors: 105

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	CLX3357 NZD CT6R	626	RU
1	Cylinder Core	CR8500	626	RU
1	Bridge Rectifier	2005M3		HS
1	Electric Strike	1500C	630	HS
1	Surface Closer	PR7500	689	NO
1	Kick Plate	K1050 10" CSK BEV	US32D	RO
1	Wall Stop	403	US26D	RO
3	Silencer (HM / WD)	608 (or) 609		RO
1	Card Reader	BY SECURITY		OT
1	Door Position Switch	BY SECURITY		OT
1	Motion Sensor (REX)	BY SECURITY		OT
1	Remote Release Button	BY SECURITY		OT

1 Lock / Strike Power BY SECURITY OT

Notes:

- Electronic Operation: Valid card or remote release push button releases electric strike; key retracts latchbolt. Free egress at all times. In case of power loss or fire alarm (if rated), door remains locked and latched.

**Set: 8.0**

Doors: 207

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Storeroom Lock	CLX3357 NZD CT6R	626	RU
1 Cylinder Core	CR8500	626	RU
1 Wall Stop	403	US26D	RO
3 Silencer (HM / WD)	608 (or) 609		RO

**Set: 9.0**

Doors: 107, 109, 111, 112

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Classroom Lock	CLX3355 NZD CT6D	626	RU
1 Cylinder Core	CR8500	626	RU
1 Wall Stop	403	US26D	RO
1 Gasketing (head/jamb)	S88BL		PE

**Set: 10.0**

Doors: 114

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Classroom Lock	CLX3355 NZD CT6D	626	RU
1 Cylinder Core	CR8500	626	RU
1 Surf Overhead Stop	10-X36	652	RF
1 Gasketing (head/jamb)	S88BL		PE

**Set: 11.0**

Doors: 118

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
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1 Classroom Lock	CLX3355 NZD CT6D	626	RU
1 Cylinder Core	CR8500	626	RU
1 Door Closer	CLP7500	689	NO
1 Kick Plate	K1050 10" CSK BEV	US32D	RO
3 Silencer (HM / WD)	608 (or) 609		RO

**Set: 12.0**

Doors: 117, 200

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
2 Classroom Intruder Lock	CLX3352 NZD CT6D	626	RU
2 Cylinder Core	CR8500	626	RU
1 Surface Closer	R7500	689	NO
1 Kick Plate	K1050 10" CSK BEV	US32D	RO
1 Wall Stop	403	US26D	RO
1 Gasketing (head/jamb)	S88BL		PE

**Set: 13.0**

Doors: 201, 202, 203

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Classroom Intruder Lock	CLX3352 NZD CT6D	626	RU
2 Cylinder Core	CR8500	626	RU
1 Surface Closer	PR7500	689	NO
1 Kick Plate	K1050 10" CSK BEV	US32D	RO
1 Wall Stop	403	US26D	RO
1 Gasketing (head/jamb)	S88BL		PE

**Set: 14.0**

Doors: 113A

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Classroom Intruder Lock	CLX3352 NZD CT6D	626	RU
2 Cylinder Core	CR8500	626	RU
1 Door Closer	CLP7500	689	NO
1 Kick Plate	K1050 10" CSK BEV	US32D	RO
1 Gasketing (head/jamb)	S88BL		PE

**Set: 15.0**

Doors: 108, 110

3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Privacy Lock	CLX3320 NZD	626C	RU
1	Wall Stop	403	US26D	RO
1	Gasketing (head/jamb)	S88BL		PE

**Set: 16.0**

Doors: 104

3	Hinge, Full Mortise, Hvy Wt	T4A3786	US26D	MK
1	Storeroom Lock	CLX3357 NZD CT6R	626	RU
1	Cylinder Core	CR8500	626	RU
1	Bridge Rectifier	2005M3		HS
1	Electric Strike	1500C	630	HS
1	Surf Overhead Stop	10-X36	652	RF
1	Surface Closer	R7500	689	NO
1	Kick Plate	K1050 10" CSK BEV	US32D	RO
1	Gasketing (head/jamb)	S88BL		PE
1	Card Reader	BY SECURITY		OT
1	Door Position Switch	BY SECURITY		OT
1	Motion Sensor (REX)	BY SECURITY		OT
1	Remote Release Button	BY SECURITY		OT
1	Lock / Strike Power	BY SECURITY		OT

Notes:

- Electronic Operation: Valid card or remote release push button releases electric strike; key retracts latchbolt. Free egress at all times. In case of power loss or fire alarm (if rated), door remains locked and latched.

**Set: 17.0**

Doors: 101

3	Hinge, Full Mortise, Hvy Wt	T4A3786	US26D	MK
1	Communicating Lock	CLX3362 NZD CT6R	626	RU
2	Cylinder Core	CR8500	626	RU
1	Bridge Rectifier	2005M3		HS

1	Electric Strike	1500C	630	HS
1	Surf Overhead Stop	10-X36	652	RF
1	Surface Closer	R7500	689	NO
1	Kick Plate	K1050 10" CSK BEV	US32D	RO
1	Gasketing (head/jamb)	S88BL		PE
1	Card Reader	BY SECURITY		OT
1	Door Position Switch	BY SECURITY		OT
1	Motion Sensor (REX)	BY SECURITY		OT
1	Remote Release Button	BY SECURITY		OT
1	Lock / Strike Power	BY SECURITY		OT

Notes:

- Electronic Operation: Valid card or remote release push button releases electric strike; key locks/unlocks each lever independently or retracts latchbolt. In case of power loss or fire alarm (if rated), door remains locked and latched.

**Set: 18.0**

Doors: 102

3	Hinge, Full Mortise, Hvy Wt	T4A3786	US26D	MK
1	Storeroom Lock	CLX3357 NZD CT6R	626	RU
1	Cylinder Core	CR8500	626	RU
1	Bridge Rectifier	2005M3		HS
1	Electric Strike	1500C	630	HS
1	Surface Closer	R7500	689	NO
1	Kick Plate	K1050 10" CSK BEV	US32D	RO
1	Wall Stop	403	US26D	RO
1	Gasketing (head/jamb)	S88BL		PE
1	Card Reader	BY SECURITY		OT
1	Door Position Switch	BY SECURITY		OT
1	Motion Sensor (REX)	BY SECURITY		OT
1	Lock / Strike Power	BY SECURITY		OT

Notes:

- Connect power supply to fire alarm system, if rated.
- Electronic Operation: Valid card releases electric strike; key retracts latchbolt. Free egress at all times. In case of power loss or fire alarm (if rated), door remains locked and latched.

END OF SECTION 087100

## SECTION 088000 – GENERAL GLAZING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
  - 1. Windows.
  - 2. Doors.
  - 3. Interior borrowed lites.
  - 4. Glazed aluminum framing systems.
  - 5. Mirrors.
- B. Related Sections include, but are not limited to, the following Division 8 Sections:
  - 1. "Hollow Metal Doors and Frames."
  - 2. "Flush Wood Doors."
  - 3. "Aluminum Entrances and Storefronts."
  - 4. "Glazed Aluminum Curtain Walls."

#### 1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass or fabricated glass as defined in referenced glazing publications.
- B. Glazing Fabricators: Firms that produce fabricated glass products from primary glass as defined in referenced glazing publications.
- C. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- D. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- E. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the fabricating process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to fabricator's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

- F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the fabricating process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to fabricator’s written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
- G. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the fabricating process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to fabricator’s written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
  - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300 and ICC’s 2009 International Building Code according to the following requirements:
    - a. Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, “Minimum Design Loads for Buildings and Other Structures”: Section 6.4.2, “Analytic Procedure,” based on mean roof heights above grade indicated on Drawings.
      - 1) Wind Design Data: As indicated on the Drawings.
      - 2) Basic Wind Speed: 90 mph.
      - 3) Importance Factor: 1.15.
      - 4) Exposure Category: C.
    - b. Specified Design Snow Loads: As indicated on Drawings, but not less than snow loads applicable to Project, required by ASCE 7, “Minimum Design Loads for Buildings and Other Structures”: Section 7, “Snow Loads”.
    - c. Probability of Breakage for Vertical Glazing: 8 lites per 1,000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
      - 1) Load Duration: 60 seconds or less.
    - d. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.



- e. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
  - f. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
  - g. Minimum Glass Thickness for Exterior Lites: Manufacturer's standard to meet wind load criteria, but not less than 6 mm.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- D. Performance Characteristics: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
- 1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
  - 2. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch-wide interspace.
  - 3. Center-of-Glass thermal and optical performance properties shall be based on data and calculations from the current LBNL Windows 5.2 computer program expressed as Btu/sq. ft. x h x deg F.
  - 4. Fenestration Performance: Performance values that take into account the total fenestration (center-of-glass and framing members) normally identified with building energy codes such as ASHRAE-IESNA 90.1 and the IECC. Values may also be tested and certified by the National Fenestration Rating Council (NFRC).
    - a. All manufactured fenestration products shall have a permanent nameplate, installed by the manufacturer, stating the U-factor, solar heat gain coefficient (SHGC) and the air leakage rate, per ASHRAE 90.1 – 5.8.2.2, or comply with the exception indicated, in which the installer or supplier of the fenestration product may provide signed and dated certification of the U-factor, SHGC and air leakage rate. Ratings indicated on the certification or labels shall be determined by an independent laboratory that is accredited by a nationally-recognized accreditation organization. The manufacturer shall declare that they will comply with either the section or the exception.

## 1.5 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: Provide 12-inch-square Samples of each glass product specified.
  - 1. Acid-Etched Glass: Provide up to 4 Samples of acid-etched glass assemblies, each representing a different pattern, as selected by the Architect from the manufacturer's full range of available patterns.

- C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
  - 1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- F. Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
- G. Product Test Reports: From a qualified testing agency, indicating the specified products comply with requirements based on comprehensive testing of standard products. Provide product test reports for each glass product.
- H. Warranties: Special warranties specified in this Section.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations for Monolithic Float Glass: Obtain all monolithic float glass from one source from a single manufacturer.
- C. Source Limitations for Insulating Glass: Obtain all insulating-glass units from one source from a single fabricator using the same type of glass and other components for each type of unit indicated.
- D. Source Limitations for Laminated Glass: Obtain all laminated glass units from one source from a single fabricator using the same type of glass and other components for each type of unit indicated.
- E. Source Limitations for Glazing Accessories: Obtain all glazing accessories from one source from a single manufacturer for each product and installation method indicated.
- F. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
  - 1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

- G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to the following publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: GANA's "Glazing Manual", "Sealant Manual" and "Laminated Glass Design Guide."
  - 2. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines."
  - 3. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
  - 4. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
- H. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Review temporary protection requirements for glazing during and after installation.
- I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:
  - 1. Insulated Glass Certification Council (IGCC).

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

#### 1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

#### 1.9 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass fabricator agreeing to furnish replacements for insulating-glass

units that deteriorate as defined in "Definitions" Article within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty on Laminated Glass: Written warranty, made out to Owner and signed by laminated-glass fabricator agreeing to furnish replacements for laminated-glass units that deteriorate as defined in "Definitions" Article within specified warranty period indicated below
1. Warranty Period: 5 years from date of Substantial Completion.
- D. Manufacturer's Special Warranty for Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass fabricator agreeing to furnish replacements for coated-glass that deteriorates as defined in "Definitions" Article within specified warranty period indicated below. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
1. Warranty Period: 5 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as required by applicable glazing code.

### 2.2 MANUFACTURERS AND FABRICATION

- A. Available Products: Subject to compliance with requirements, manufacturers of monolithic float glass that may be incorporated into the Work include, but are not limited to, the following:
1. PPG Industries, Inc.
  2. Guardian Industries, Inc.
  3. Pilkington, Inc.
  4. ACH (formerly Visteon).
- B. Available Fabricators: Subject to compliance with requirements, fabricators of the products specified include, but are not limited to, the following:
1. J. E. Berkowitz, L.P.; (800) 257-7827.
  2. Viracon, Inc.
  3. Arch Aluminum, Inc.
  4. Oldcastle Glass.

## 2.3 MONOLITHIC FLOAT GLASS

- A. Float Glass: ASTM C 1036, Type 1, Class 1 (clear), Class 2 (tinted) transparent glass, flat, Quality q3 (glazing select); class, kind and condition indicated.
  - 1. Provide Kind FT (fully tempered), Category 2, where safety glass is required by the applicable glazing codes.

## 2.4 HEAT-TREATED FLOAT GLASS

- A. Heat-Treated Float Glass: ASTM C 1048; Type I; Class I (clear), Class 2 (tinted) transparent glass, flat, Quality q3 (glazing select); class, kind, and condition as required by the applicable glazing code. Provide in thicknesses indicated.
  - 1. Acid-Etched Glass: Provide where indicated; finish as selected by Architect from manufacturer's full range of standard acid-etched finishes. Glass panels in all fenestration types that are either partially or completely below 80 inches above respective finished floor levels, as well as any other locations specifically indicated on the Drawings or as required by applicable building code, shall consist of tempered glass.
- B. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
  - 1. Flatness Tolerances:
    - a. Roller-Wave or Ripple: Deviation from flatness at any peak shall be targeted not to exceed 0.003" as measured per peak to valley for 1/4 (6 mm) thick glass.
    - b. Bow and Warp: The bow and warp tolerances targeted shall not exceed 1/32 inch per linear foot.

## 2.5 MIRROR GLASS

- A. General: Silvered flat glass mirrors, fully-tempered and qualifying as safety glazing. In compliance with ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.
- B. Tempered Glass Mirrors: Mirror Glazing Quality for blemish requirements and complying with ASTM C 1048 for Kind FT, Condition A, tempered float glass before silver coating is applied; clear.
  - 1. Nominal Thickness: 6.0 mm; 1/4 inch.
  - 2. Edge Treatment: Square/flat, non-chamfered; polished.
- C. Miscellaneous Materials:
  - 1. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at glass edges.
  - 2. Setting Blocks: As needed; elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

3. Hardware: Aluminum J-Channel extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover edges of mirrors in a single piece.
  - a. Locations: Top and bottom, continuous.
  - b. Finish: Clear anodized.
  - c. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
  - d. Anchors and inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield, expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.
  
- D. One-Way Vision (Mirror) Glass (Transparent Mirrors): Type I, Class 1, Quality q1; 6.0 mm (1/4 inch) thick tempered glass, with coating on one face with a hard, adherent film of chromium or other approved coating of equal or greater durability.
  1. Glass shall transmit not less than 5 percent or more than 11 percent of total incident visible light and shall reflect from the front surface of the coating not less than 45 percent of the total incident visible light.

## 2.6 INSULATING GLASS

- A. Insulating Glass Units – General: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 2190 for Class CBA units and with requirements specified in this Article.
  1. Type **IG-1** Insulated Glass: Insulated glass units consisting of two lites of clear, annealed glass, separated by a 1/2-inch sealed air space. Provide insulated units with low “E” coating. *For use in the building’s perimeter openings that are primarily facing North and East; refer to Drawings and Schedules for applied use.*
    - a. Basis-of-Design Product: Subject to compliance with requirements, provide units fabricated with “PPG Solarban 60 Clear” or comparable product, with the following characteristics:
      - 1) Ultra Violet: 18%.
      - 2) Visible Light Transmittance: 70%.
      - 3) Total Solar Energy Transmittance: 33%.
      - 4) Winter Night-time U Value: .29.
      - 5) Summer Day-time U Value: .28.
      - 6) Shading Co-efficient: .43.
      - 7) Solar Heat Gain Co-efficient: .38.
      - 8) Light to Solar Gain: 1.84.
    - b. Insulating Glass Unit Make-up:
      - 1) Outboard Lite: “PPG Solarban 60 Clear,” 1/4-inch thick.
      - 2) Low “E” coating on second surface.
      - 3) 1/2-inch-thick desiccant-filled aluminum spacer.
      - 4) Inboard Lite: 1/4-inch-thick clear glass.
      - 5) Overall Thickness: 1 inch.

2. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article.
  3. Provide Kind FT (fully tempered) where safety glass is required by the applicable glazing codes.
  4. Locations: Insulating glass shall be used in all exterior hollow metal and aluminum doors, aluminum-framed curtain walls, storefronts and vents. Insulated glass in doors and sidelites that are either partially or completely below the door head height, as well as any other locations specifically indicated on the Drawings or as required by applicable building code, shall consist of tempered glass.
  5. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article.
  6. Provide Kind FT (fully tempered) where safety glass is required by the applicable glazing codes.
  7. Locations: Insulating glass shall be used in all exterior curtain walls, storefronts/entrances, windows/vents and doors. Insulating glass in doors and sidelites (partially or completely below the door head height) and other locations indicated on the Drawings, or as required by applicable code, shall consist of tempered glass.
- B. Sealing System: Dual seal, with primary and secondary sealants as follows:
1. Dual air seal of polyisobutylene (PIB) and secondary seal of silicone.
- C. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
1. Spacer Material: Aluminum with mill or clear-anodized finish.
  2. Desiccant: Molecular sieve or silica gel, or blend of both.
  3. Corner Construction: Manufacturer's standard corner construction.

## 2.7 LAMINATED GLASS

- A. Laminated Glass – General: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
1. Construction: Laminate glass with interlayers, to comply with interlayer manufacturer's written recommendations, unless otherwise noted.
  2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements. One or multiple layers, formulated to absorb the majority of all naturally-occurring ultraviolet (UV) radiation from sunlight and provide long-term stability with built-in UV filtering.

3. Basis-of-Design Products: Subject to compliance with requirements, provide the following interlayer products, or comparable interlayer products by other manufacturers that meet the standards of quality:
  - a. Polyvinyl butyral (PVB): DuPont "Butacite."
  - b. Acoustic: DuPont "SentryGlas Acoustic."
  - c. High-Security: DuPont "SentryGlas."
  
- B. Type **LG-1** – Insulated Laminated Safety Glass: Insulated glass units consisting of one lite of 1/4-inch clear annealed glass and one lite of 7/16-inch laminated tempered glass (two 3/16-inch-thick lites of clear, tempered safety glass laminated with a high-security PVB interlayer equal to DuPont "SentryGlas"), separated by a 3/8-inch sealed air space. Provide insulated units with low "E" coating. For use at the primary exterior main entrance aluminum storefront and entrance system and glazed aluminum curtain wall assemblies, where indicated on the Drawings.
  1. Type **LG-1**: Insulated Laminated Safety Glass; this type of glazing assembly shall be used in the building's perimeter openings that are primarily facing *North* and *East*.
    - a. Basis-of-Design Product: Subject to compliance with requirements, provide units fabricated with "PPG Solarban 60 Clear" or comparable product, with the following characteristics:
      - 1) Ultra Violet: 18%.
      - 2) Visible Light Transmittance: 70%.
      - 3) Total Solar Energy Transmittance: 33%.
      - 4) Winter Night-time U Value: .29.
      - 5) Summer Day-time U Value: .28.
      - 6) Shading Co-efficient: .43.
      - 7) Solar Heat Gain Co-efficient: .38.
      - 8) Light to Solar Gain: 1.84.
    - b. Insulating Glass Unit Make-up:
      - 1) Outboard Lite: "PPG Solarban 60 Clear," 1/4 inch thick.
      - 2) Low "E" coating on second surface.
      - 3) 3/8-inch-thick desiccant-filled aluminum spacer.
      - 4) Inboard Lite: 7/16-inch-thick clear glass, as follows:
        - a) First Surface: Clear tempered glass, 3/16-inch thick.
        - b) Interlayer: High-Security, 0.060-inch-thick; clear.
        - c) Second Surface: Clear tempered glass, 3/16-inch thick.
        - d) Overall Inboard Lite Thickness: 7/16 inch.
      - 5) Overall Thickness: 1 inch.
  
- C. Type **LG-2** – Laminated Safety Glass: Glass units consisting of one lite of 7/16-inch laminated tempered glass (two 3/16-inch-thick lites of clear, tempered safety glass laminated with a high-security PVB interlayer). For use at the primary interior main entrance aluminum storefront and entrance systems, where indicated on the Drawings.



## 2.8 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of any of the materials indicated below, complying with standards referenced with type of elastomer and of profile and hardness required to maintain watertight seal:
1. Neoprene, ASTM C 864.
  2. EPDM, ASTM C 864.
  3. Silicone, ASTM C 1115.
  4. Thermoplastic polyolefin rubber, ASTM C 1115.

## 2.9 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rods as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800.

## 2.10 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. VOC Content: For Sealants used inside weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, subpart D.
- C. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- D. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.
- E. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- F. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

## 2.11 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.

- C. Grind smooth and polish exposed glass edges and corners.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep system.
  - 3. Minimum required face or edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

### 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch minimum bite of spacers on glass.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Mirror Installation: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
  1. Provide a minimum airspace of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
  2. Install mirrors with mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
    - a. Aluminum J-Channels: Provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long at bottom channel.
- J. One-Way Vision Glass Installation: Verify proper direction of vision source prior to installation. Install in same method as clear tempered glazing panels, using caution to not damage coating surface.

### 3.4 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

### 3.5 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION 088000

## SECTION 092216 - NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Non-load-bearing steel framing systems for interior partitions.
- 2. Suspension systems for interior ceilings and soffits.
- 3. Grid suspension systems for gypsum board ceilings.

- B. Related Requirements:

- 1. Division 5 Section "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.
- 2. Division 6 Section "Sheathing" for exterior wall, ceiling and soffit gypsum-based sheathing to be applied to metal framing systems.
- 3. Division 9 Section "Gypsum Board" for interior and exterior gypsum board to be applied to metal framing systems.

#### 1.3 ACTION SUBMITTALS

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

- 1. Studs and Runners: Provide documentation that framing members' certification is according to SIFA's "Code Compliance Certification Program for Cold-Formed Steel Structural and Non-Structural Framing Members."

- B. Shop Drawings: For substantial suspended bulkhead assemblies. Include layout, spacings, sizes, thicknesses, and types of light-gauge metal framing; fabrication; and fastening and anchorage details, including threaded rods and mechanical fasteners.

- 1. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

- C. Delegated-Design Submittal: For light-gauge metal framing assemblies required for substantial suspended bulkhead assemblies.
  - 1. Architect reserves the right to revise quantities and locations of various suspension components if aesthetic requirements are not met per the proposed structural layout.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For embossed steel studs and runners and firestop tracks, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Notify manufacturer of damaged materials received prior to installation.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI's "Code of Standard Practice."

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Design framing systems in accordance with American Iron and Steel Institute Publication "North American Specification for the Design of Cold-Formed Steel Framing – Nonstructural Members", except as otherwise shown or specified.
- D. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft. minimum, as required by applicable building code.

#### 2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653, G40, hot-dip galvanized unless otherwise indicated.
- B. Studs and Runners: ASTM C 645; use either steel studs and runners or dimpled steel studs and runners.
1. Steel Studs and Runners:
    - a. Minimum Base-Metal Thickness: 26 gauge, minimum.
    - b. Depth: As indicated on Drawings.
  2. Dimpled Steel Studs and Runners:
    - a. Minimum Base-Metal Thickness: 28 gauge, minimum.
    - b. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch-deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
  2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
    - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering deflection tracks that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Clark Dietrich Building Systems.
      - 2) Marino\WARE.
      - 3) FireTrak Corp.
      - 4) MBA Building Supplies.
      - 5) Metal-Lite.
      - 6) Steel Network, Inc. (The).
      - 7) Telling Industries.
- D. Curved Tracks: Manufacturer's standard continuous lengths of segmented floor and head-of-wall tracks designed to form to radii indicated for non-load-bearing walls, ceilings and bulkheads, permanently secured into place by attaching segments to supports and to one another via pre-punched holes in flanges and webs. Tracks shall match gauge, depth and finish of adjoining framing members.
1. Provide manufacturer's standard flexible, segmented angles and similar supplemental accessories necessary to form configurations as indicated.

2. Available Products: Subject to compliance with requirements, manufacturers offering non-load-bearing curved wall, ceiling and bulkhead tracks that may be incorporated into the Work include, but are not limited to, the following:
  - a. Clark Dietrich Building Systems "Contour Track."
  - b. Radius Track Corporation "Ready Track."
  - c. Duraframe Solutions "Curv-Trak."
  - d. Flex-Ability Concepts "Flex-C Trac."
  - e. SCAFCO Corp. "Perfect Curve."
  
- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
  1. Minimum Base-Metal Thickness: 26 gauge, minimum.
  
- F. Cold-Rolled Channel Bridging: Steel, 17 gauge minimum base-metal thickness, with minimum 1/2-inch-wide flanges.
  1. Depth: As indicated on Drawings.
  2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 15-gauge-thick, galvanized steel.
  
- G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
  1. Minimum Base-Metal Thickness: 26 gauge, minimum.
  2. Depth: As indicated on Drawings.
  
- H. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 26 gauge, and depth required to fit insulation thickness or depth indicated.

## 2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- B. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 17 gauge and minimum 1/2-inch-wide flanges.
  1. Depth: 2-1/2 inches minimum, or as indicated on Drawings.
- D. Threaded Rods: For suspended gypsum board assemblies, where indicated; ASTM A 307, Grade A; roll-threaded to ASME, B1.1 UNC and UNF, and UNS Class 1A; low-carbon, zinc-plated coating, Fe/Zn 3AT per ASTM F 1941; threaded rod assemblies shall be field-painted, unless otherwise indicated.



1. Lengths, diameters and spacing as required for each suspended gypsum board assembly; provide minimum quantities of threaded rod assemblies as necessary, and in the most inconspicuous manner as possible.

E. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 17 gauge uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
2. Steel Studs and Runners: ASTM C 645.
  - a. Minimum Base-Metal Thickness: 26 gauge, minimum.
  - b. Depth: 2-1/2 inches minimum, or as indicated on Drawings.
3. Dimpled Steel Studs and Runners: ASTM C 645.
  - a. Minimum Base-Metal Thickness: 28 gauge, minimum.
  - b. Depth: 2-1/2 inches minimum, or as indicated on Drawings.
4. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
  - a. Minimum Base-Metal Thickness: 26 gauge, minimum.

F. Grid Suspension System for Gypsum Board Ceilings (suggested framing system for custom, site-fabricated acoustical ceiling clouds/panels): ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock. Include angle clips and other accessories to achieve required configuration, including curves.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering grid suspension systems for gypsum board ceilings that may be incorporated into the Work include, but are not limited to, the following:
  - a. Drywall Grid System; Armstrong World Industries, Inc.
  - b. Chicago Metallic Corporation.
  - c. USG Corporation.

## 2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
  - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

### 3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### 3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
  - 1. Single-Layer Application: 16 inches o.c., unless otherwise indicated.
  - 2. Multilayer Application: 16 inches o.c., unless otherwise indicated.
  - 3. Tile Backing Panels: 16 inches o.c., unless otherwise indicated.

- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb, unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
    - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
  - 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
  - 6. Curved Partitions:
    - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.
- E. Direct Furring: Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Z-Furring Members:

1. Erect insulation at orientation and spacing as indicated, and hold in place with Z-furring members.
  2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
  3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

### 3.5 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches o.c., unless otherwise indicated.
  2. Carrying Channels (Main Runners): 48 inches o.c., unless otherwise indicated.
  3. Furring Channels (Furring Members): 16 inches o.c., unless otherwise indicated.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
  2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
    - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
  3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  4. Do not attach hangers to steel roof deck.
  5. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
  6. Do not connect or suspend steel framing from ducts, pipes, or conduit.

- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216



## SECTION 092900 - GYPSUM BOARD

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

#### A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.
3. Sound attenuation blankets, acoustical sealants and other accessories.

#### B. Related Requirements:

1. Division 5 Section "Cold-Formed Metal Framing" for structural framing and suspension systems that support gypsum board panels.
2. Division 6 Section "Sheathing" for gypsum-based sheathing for exterior walls, roofs, ceilings and soffits.
3. Division 9 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.
4. Division 9 Section "Tiling" for cementitious backer units installed as substrates for ceramic tile.

### 1.3 ACTION SUBMITTALS

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

### 1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

### 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

### 2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

### 2.3 INTERIOR GYPSUM BOARD

- A. 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. United States Gypsum Co.
  - 2. National Gypsum Co.; Gold Bond Building Products Division.
  - 3. Georgia-Pacific Corp.
  - 4. American Gypsum Co.
- B. Gypsum Board, Type X: ASTM C 1396.
  - 1. Thickness: 5/8 inch.
  - 2. Long Edges: Tapered, or tapered and featured (rounded or beveled) for pre-filling.
- C. Flexible Gypsum Board: ASTM C 1396; manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
  - 1. Thickness: 1/4 inch.
  - 2. Long Edges: Tapered.



- D. Gypsum Ceiling Board: ASTM C 1396.
  - 1. Thickness: 1/2 inch.
  - 2. Long Edges: Tapered.
  
- E. Abuse-Resistant Gypsum Board: ASTM C 1629, tested according to ASTM C 1629.
  - 1. Core: 5/8 inch, Type X.
  - 2. Surface Abrasion: ASTM C 1629, meets or exceeds Level 3 requirements.
  - 3. Indentation: ASTM C 1629, meets or exceeds Level 3 requirements.
  - 4. Soft-Body Impact: ASTM C 1629, meets or exceeds Level 3 requirements.
  - 5. Long Edges: Tapered.
  - 6. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
  
- F. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396. With moisture- and mold-resistant core and paper surfaces.
  - 1. Core: 5/8 inch, Type X.
  - 2. Long Edges: Tapered.
  - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

#### 2.4 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178, with manufacturer's standard edges. Product is the recommended alternative to cementitious backer board.
  - 1. Core: 1/2 or 5/8 inch, as indicated on Drawings, Type X.
  - 2. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
  - 3. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Georgia-Pacific Corp.; "DensShield."
    - b. United States Gypsum Co.; "Durock Glass-Mat Tile Backerboard."
    - c. National Gypsum Co.; "Gold Bond eXP Tile Backer."
  
- B. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.
  - 1. Description: Noncombustible and water-resistant; mold-resistance per ASTM D 3273, score of 10 as rated according to ASTM D 3274.
  - 2. Thickness: 1/2 or 5/8 inch, as indicated on Drawings.
  - 3. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. United States Gypsum Co.; "Durock Cement Board."

- b. National Gypsum Co.; Gold Bond Building Products Division. "PermaBase."
- c. James Hardie Building Products, Inc.; "HardieBacker."
- d. CertainTeed Corp.; a Saint-Gobain company; "Diamondback GlasRoc."
- e. SelectCrete, Inc.
- f. Fin Pan, Inc.

## 2.5 TRIM ACCESSORIES

### A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. United States Gypsum Co.
  - b. National Gypsum Co.
  - c. Georgia-Pacific Corp.
  - d. Fry Reglet Corporation.
  - e. Gordon Inc.
  - f. Pittcon Industries.
3. Shapes:
  - a. Cornerbead.
  - b. Bullnose bead.
  - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
  - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
  - e. Expansion (control) joint; one-piece, formed with V-shaped slot and removable strip covering slot opening.
  - f. Curved-Edge Cornerbead: With notched or flexible flanges.

### B. Reveals: Where specifically indicated and exposed to view; interior architectural, decorative gypsum board reveal channels and control joints; extruded accessories of profiles and dimensions indicated.

1. Material: Aluminum; alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
2. Finish: Provide corrosion-resistant primer compatible with joint compound and finish materials specified. Provide in manufacturer's standard Class I or II clear anodic finish; reveal trim shall be painted where indicated on Drawings.
3. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Fry Reglet Corp.

- b. Gordon Inc.
  - c. Pittcon Industries.
4. Shapes: Provide the following, where indicated; provide control joints where indicated or as required per standards:
- a. Standard Reveals: Equal to Fry Reglet Corp. "Channel Screed Reveal;" 1/4-inch width, unless otherwise noted; for use on ceiling and horizontal or vertical (non-control joint) applications.
  - b. Wall-Ceiling Reveals: Equal to Fry Reglet Corp. "'F' Reveal;" 1/4-inch width, unless otherwise noted; for horizontal wall-to-ceiling or vertical wall-to-wall applications.
  - c. Control Joints: Equal to Fry Reglet Corp. "2-Piece Control Joint;" 1/4-inch width, unless otherwise noted; for use on ceiling and vertical control joint applications.
  - d. Provide other shapes if specifically indicated on Drawings.

## 2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:
  - 1. Interior Gypsum Board: Paper.
  - 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
  - 3. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joint, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping or drying-type, all-purpose compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use setting-type, sandable topping or drying-type, all-purpose compound.
  - 4. Finish Coat: For third coat, use setting-type, sandable topping or drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
  - 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
  - 2. Cementitious Backer Units: As recommended by backer unit manufacturer.

## 2.7 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.
  - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
  - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. 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.
- E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90. Minimum STC of 53 when applied in accordance with ASTM C 919.
  - 1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Accumetric LLC; "BOSS 826 Acoustical Sound Sealant."
    - b. Franklin International; "Titebond Acoustical Smoke & Sound Sealant."
    - c. Grabber Construction Products; "Acoustical Smoke & Sound Sealant."
    - d. Hilti, Inc.; "CP 506."
    - e. Pecora Corporation; "AIS-919."
    - f. Specified Technologies, Inc.; "Smoke 'N' Sound Acoustical Sealant."
    - g. United States Gypsum Co.; "USG Sheetrock Brand Acoustical Sealant."
- F. Thermal Insulation: As specified in Division 4 Section "Unit Masonry Assemblies" and Division 7 Section "Thermal Insulation."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. 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.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8 inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2 inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

### 3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  - 1. Wallboard Type: Vertical surfaces unless otherwise indicated.
  - 2. Type X: Where required for fire-resistance-rated assembly.
  - 3. Flexible Type: Apply in double layer at curved assemblies.
  - 4. Ceiling Type: Ceiling surfaces.
  - 5. Abuse-Resistant Type: Vertical surfaces of all Storage and Custodial rooms.
  - 6. Moisture- and Mold-Resistant Type: All vertical interior surfaces of exterior walls.
- B. Single-Layer Application:
  - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
  - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) or horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
  - 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
  - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
  - 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
  - 2. vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer

joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

3. Fastening Methods: Fasten base layers and face layers separately to supports with screws, or fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

E. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

### 3.4 APPLYING TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Cementitious Backer Units: Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

### 3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings, and if not indicated, according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. Bullnose Bead: Use at outside corners.
3. LC-Bead: Use at exposed panel edges.

4. U-Bead: Use at exposed panel edges.
5. Curved-Edge Cornerbead: Use at curved openings.

### 3.6 FINISHING GYPSUM BOARD

- 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. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  2. Level 2: Panels that are substrate for tile.
  3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

### 3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900



## SECTION 093000 – TILING

### 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. Porcelain floor tile.
2. Porcelain wall tile.
3. Waterproof/crack isolation membrane.
4. Engineered Marble thresholds.

- B. Related Sections:

1. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Division 9 Section "Gypsum Board" for tile backing panels.

#### 1.3 DEFINITIONS

- A. General: Definitions in the ANSI A 108 series of tile installation standards and in ANSI A137.1 and ANSI A137.3 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, 108.02, 108.1A, 108.1B, 108.1C, 108.4 through 108.6, and 108.8 through 108.17, ANSI 108.19 which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.
2. Require attendance of installation material manufacturer, tile supplier, tile installer and installers of related work. Review installation procedures and coordination required with related work.

3. Meeting agenda includes but is not limited to:
  - a. Tile and installation material compatibility.
  - b. Grouting procedure.
  - c. Maintenance and cleaning products and methods.
  - d. Surface preparation.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples: Contractor shall provide manufacturer's color PDF images of tile, grout, accessories & transition strips for review & approval. Actual samples are NOT required unless specifically requested by the architect/interior designer.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product, signed by product manufacturer.
- D. Material Test Reports: For each tile-setting and grouting product.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
  2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

#### 1.8 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile from one source or producer.
  1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
  - 1. Joint sealants.
  - 2. Waterproof/crack isolation membrane.
  - 3. Engineered Marble thresholds.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockup of each type of wall tile installation with metal edge strips. Coordinate location with Owner and Architect. Do not order tile and metal edge strips until site mock up is approved by the architect and the owner.
  - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 and ANSI A137.3 for labeling tile packages.
- B. Store tile and materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

#### 1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

## PART 2 - PRODUCTS

### 2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
  - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by current edition TCNA Handbook Ceramic, Glass and Stone Tile Installation and TCNA Handbook for Gauge Porcelain Tile and Gauge Porcelain Tile Panels/Slab methods specified in tile installation schedules, and other requirements specified.
- C. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
  - 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

### 2.2 TILE PRODUCTS

- A. Porcelain Floor Tile - Type (PT1):
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Garden State Tile
  - 2. Pattern: Anthem
  - 3. Composition: Porcelain.
  - 4. Module Size: 12 inches by 24 inches
  - 5. Thickness: 9.5mm
  - 6. Color: EJA1 Dark Nat. Rett.
  - 7. Finish: Natural
  - 8. Installation: 1/3 Running Bond
  - 9. Grout Color: As selected by Architect from manufacturer's full range.
- B. Porcelain Wall Tile - Type (PT2):
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Garden State Tile
  - 2. Pattern: Anthem
  - 3. Composition: Porcelain.

4. Module Size: 12 inches by 24 inches
5. Thickness: 9.5mm
6. Color: EJ9Y Steel White, Nat. Rett.
7. Finish: Natural
8. Installation: 1/3 Running Bond
9. Grout Color: As selected by Architect from manufacturer's full range.

### 2.3 PRIMER

- A. Multipurpose Bond-Promoting Primer: Low-VOC, synthetic resin-based primer with bond-promoting silica aggregates suspended in a dispersion, for interior and exterior applications.
  1. Basis of Design:
    - a. MAPEI Corporation: ECO Prim Grip.
  2. Approved Manufacturers: Subject to compliance with requirement.
    - a. Laticrete International, Inc.
    - b. Custom Building Products

### 2.4 PATCHING AND SKIMCOATING COMPOUND

- A. Cementitious patching and skimcoating compound.
  1. Basis of Design:
    - a. MAPEI Corporation: Provide one of the following:
      - 1) Mapecem Quickpatch.
      - 2) Planiprep PSC.
  2. Approved Manufacturers: Subject to compliance with requirement.
    - a. Laticrete International, Inc.
    - b. Custom Building Products

### 2.5 WATERPROOF/CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, which complies with ANSI A118.10 and ANSI A118.12 is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
  1. Basis of Design:

- a. MAPEI Corporation: Mapelastic AquaDefense.
2. Approved Manufacturers: Subject to compliance with requirements.
- a. Laticrete International, Inc.: Hydroban.
  - b. Custom Building Products: RedGuard Waterproofing and Crack Prevention Membrane.

## 2.6 SETTING MATERIALS

- A. Large and Heavy Tile Mortar, Modified Dry-Set Mortar (“H” as rated by ANSI): Comply with requirements in ANSI A118.4H. Provide product that is approved by manufacturer for application thickness up to 1/2 inch.
- 1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
  - 2. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
  - 3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4HT.
  - 4. Basis of Design:
    - a. MAPEI Corporation: Provide one of the following:
      - 1) Ultralite S2
      - 2) Ultrabond ECO GPT
      - 3) Granirapid System
  - 5. Approved Manufacturers: Subject to compliance with requirement.
    - a. Laticrete International, Inc.
    - b. Custom Building Products

## 2.7 GROUT MATERIALS

- A. Polymer-Modified Tile Grout: Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients. Comply with requirements in ANSI A118.7.
- 1. Basis of Design:
    - a. MAPEI Corporation: Ultracolor Plus FA
  - 2. Approved Manufacturers: Subject to compliance with requirement.
    - a. Laticrete International, Inc.
    - b. Custom Building Products

## 2.8 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 7 Section "Joint Sealants."
1. Sealants shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  2. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
  3. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.
  4. Basis of Design:
    - a. MAPEI Corporation: Mapesil T Plus.
  5. Approved Manufacturers: Subject to compliance with requirement.
    - a. Laticrete International, Inc.
    - b. Custom Building Products
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

## 2.9 MISCELLANEOUS MATERIALS

- A. Trowelable Floor/Wall Patch and Render Mortar: Quick-setting, polymer-modified, fiber-reinforced, cementitious rendering, patching, ramping and leveling mortar. Can be applied from 1/8 inch to 1-1/4 inches (3 mm to 3.2 cm).
1. Basis of Design:
    - a. MAPEI Corporation: Planitop 330 Fast.
  2. Approved Manufacturers: Subject to compliance with requirement.
    - a. Laticrete International, Inc.
    - b. Custom Building Products.
- B. Cement Grout Haze Remover: Professional-strength, water-based formulation that helps remove cement grout haze from tile, concrete and acid-resistant natural-stone surfaces; acidic, low-odor, and nonflammable.
1. Basis of Design:
    - a. MAPEI Corporation: UltraCare Cement Grout Haze Remover

2. Approved Manufacturers: Subject to compliance with requirement.

- a. Laticrete International, Inc.
- b. Custom Building Products.

C. Water-Based Penetrating Grout Sealer: Provides protection against staining for use with sanded and unsanded cementitious grout joints. Can also be used as a pre-grouting sealer.

1. Basis of Design:

- a. MAPEI Corporation: UltraCare Grout Sealer.

2. Approved Manufacturers: Subject to compliance with requirement.

- a. Laticrete International, Inc.
- b. Custom Building Products.

## 2.10 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

## 2.11 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

B. Engineered Marble Thresholds:

- 1. Manufacture: MSI or Equal
- 2. Color: Refer to Drawings.
- 3. Finish: Polished



## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
  2. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
    - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
    - c. Verify when using tiles with all edges shorter than 15 inches (38 cm) in length, the maximum allowable variation in the substrate is 1/4-inch in 10 feet (6 mm in 3.05 m) from the required plane, with no more than 1/16-inch variation in 12 inches (1.5 mm in 30 cm) when measured from the high points in the surface.
    - d. Verify when using large-format tiles with at least one edge of 15 inches (38 cm) and larger in length, the maximum allowable variation in the substrate is 1/8-inch in 10 feet (3 mm in 3.05 m) from the required plane, with no more than 1/16-inch of variation in 24 inches (1.5 mm in 61 cm) when measured from the high points in the surface.
  3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
  4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from

other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

### 3.3 TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
  - 1. For the following installations, follow procedures in the ANSI A108 Series of Tile Installation Standards for providing 95 percent mortar coverage:
    - a. Tile composed of tiles 8 by 8 inches or larger.
    - b. Tile floors consisting of rib-backed tiles.
    - c. Tile floors in commercial applications
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
  - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
  - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
  - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
  - 1. Porcelain Wall Tile (PT1): 1/8-inch.
  - 2. Porcelain Floor Tile (PT1): 1/8-inch.
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Comply with TCNA indications for type of installation and comply with their written recommendations for expansion joints for wall and floor applications. Provide expansion

joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
  2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."
- I. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- J. Engineered Marble Thresholds: Install engineered marble thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
1. Do not extend waterproofing or crack isolation membrane] under thresholds set in modified dry-setmortar. Fill joints between such thresholds and adjoining tile set on waterproofing or crack isolation membrane with elastomeric sealant.

### 3.4 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A118.10 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

### 3.5 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
1. Remove latex-Portland cement grout residue from tile as soon as possible.
  2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
- B. Protection: Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
1. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

2. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

### 3.6 INTERIOR TILE INSTALLATION SCHEDULE

#### A. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation TCNA F122A-23: Medium-set mortar on waterproof membrane in accordance with ANSI A118.4. For Restroom applications, apply waterproof membrane in accordance with ANSI A118.10.
  - a. Tile Type: PT1.
  - b. Mortar: Improved Modified Dry-Set Cement Mortar, Non-Sag, for Large and Heavy Tile LHT/Medium-bed, modified dry-set mortar.
  - c. Grout: High-Performance Cement Grout that meets or exceeds ANSI A118.7.

#### B. Interior Wall Installations:

1. Tile Installation W245-23: Medium-set mortar on backer units in accordance with ANSI A108.5 and A108.11. Restroom applications, apply waterproof membrane in accordance with ANSI A118.10.
  - a. Tile Type: PT2.
  - b. Mortar: Improved Modified Dry-Set Cement Mortar, Non-Sag, for Large and Heavy Tile LHT/Medium-bed, modified dry-set mortar.
  - c. Grout: High-Performance Cement Grout that meets or exceeds ANSI A118.7.

END OF SECTION 093000

## SECTION 095113 - ACOUSTICAL PANEL CEILINGS

### 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. Mineral-based, factory-painted acoustical ceiling panels.
  - 2. Standard and specialty exposed grid suspension systems.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.4 ACTION SUBMITTALS

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

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Suspended ceiling components.
  - 2. Structural members to which suspension systems will be attached.
  - 3. Size and location of initial access modules for acoustical panels.
  - 4. Items penetrating finished ceiling including, but not limited to, the following:
    - a. Lighting fixtures.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Access panels.
  - 5. Perimeter moldings.
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.

- D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.
- E. Field quality-control reports.
- F. Samples for Initial Selection: Contractor shall provide manufacturer's color PDF images of acoustical ceiling panels and suspension system for review & approval. Actual samples are NOT required unless specifically requested by the architect/interior designer.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Acoustical Panels: Full-size panels equal to 2 percent of quantity installed, in each pattern and color provided.
  - 2. Suspension-System Components: Quantity of each exposed component equal 2 percent of quantity installed, in each color and style provided.

#### 1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

#### 1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
  - 2. Smoke-Developed Index: 50 or less.
- C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

### 2.2 ACOUSTICAL PANELS, GENERAL

- A. Low-Emitting Materials: Acoustical panel ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.
- C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance unless otherwise indicated.
- D. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
  - 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

### 2.3 ACOUSTICAL PANELS – TYPE (ACT1)

- A. Manufacturers and Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
  - 1. Armstrong World Industries, Inc.; School Zone, Fine Fissured, No.1714.
- B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type III, mineral base with painted finish.
  2. Color: White.
  3. LR: 0.84.
  4. NRC: Not less than 0.70.
  5. CAC: Not less than 40.
  6. Edge Detail: Square.
  7. Thickness: 3/4 inch.
  8. Modular Size: Nominal 24 by 48 inches.
- C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.
- D. Suspension System Type: Applications and types as indicated on Drawings and Paragraph 2.6, B.

#### 2.4 ACOUSTICAL PANELS – TYPE (ACT2)

- A. Manufacturers and Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
1. Armstrong World Industries, Inc.; School Zone, Fine Fissured, No.1713.
- B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
1. Type and Form: Type III, mineral base with painted finish.
  2. Color: White.
  3. LR: 0.84.
  4. NRC: Not less than 0.70.
  5. CAC: Not less than 35.
  6. Edge Detail: Square.
  7. Thickness: 3/4 inch.
  8. Modular Size: Nominal 24 by 24 inches.
- C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.
- D. Suspension System Type: Applications and types as indicated on Drawings and Paragraph 2.6, B.



## 2.5 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
  - 1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- B. Wire Hangers, Braces, and Ties: Provide the following wire types, based on Project requirements:
  - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.
    - a. Hanger wire shall be 12 gauge/.105 (Diameter Range: .105-.107); Carbon: C1006; Length: 12 feet; Tensile: 54/62,000 KSI; Breaking Load Minimum: 475 pounds; Breaking Load Maximum: 540 pounds; Safe Load Maximum: 275 pounds; Finish: Hot Dip Galvanized; Galvanize Coating: Class I, in accordance with ASTM-641/A.
  - 2. Stainless-Steel Wire: ASTM A 580, Type 304, nonmagnetic.
    - a. 1/16" air craft cable shall have a minimum breaking strength of 275 pounds.
  - 3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
  - 4. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A 653, G90 coating designation; with bolted connections and 5/16-inch diameter bolts.
- E. Hold-Down Clips: Provide for all air lock and security applications, including vestibules, restrooms and locker rooms, where occurs; provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.

## 2.6 METAL SUSPENSION SYSTEM

- 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. Armstrong World Industries, Inc.
- B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically-zinc-coated, or hot-dip galvanized according to ASTM A 653, not less than G30 (Z90) coating designation; with prefinished 15/16-inch-wide metal caps on flanges.

1. Basis of Design: Equal to Armstrong, "Prelude".
2. Structural Classification: Intermediate duty system.
3. End Condition of Cross Runners: Butt-edge type.
4. Face Design: Flat, flush.
5. Cap Material: Cold-rolled steel.
6. Cap Material @ moisture exposed areas (i.e. restrooms, shower etc): Aluminum cold rolled sheet.
7. Cap Finish: White.

## 2.7 METAL EDGE MOLDINGS AND TRIM

- 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. Armstrong World Industries, Inc.
  2. USG Interiors, Inc.; Subsidiary of USG Corporation.
  3. CertainTeed, Saint-Gobain.
- B. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:
  1. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 for Alloy and Temper 6063-T5.
  2. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils. Comply with ASTM C 635 and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

### 3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
  - 1. Fire-Rated Assembly: If indicated, install fire-rated ceiling systems according to tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  - 2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
  - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
  - 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  - 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
  - 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
  - 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
  - 8. Do not attach hangers to steel deck tabs or any other part of steel deck. Attach hangers to structural members only.
  - 9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
  - 10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
  - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
  - 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
  - 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
  - 1. Arrange directionally patterned acoustical panels as indicated on Drawings.
  - 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
  - 3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
  - 4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
  - 5. Paint cut edges of panel remaining exposed after installation; precisely match color of exposed panel surfaces using coating furnished or recommended in writing for this purpose by acoustical panel manufacturer.
  - 6. Install hold-down clips for all air lock applications, including vestibules, and in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions unless otherwise indicated.
  - 7. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

### 3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

## SECTION 096513 - RESILIENT BASE AND ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Thermoplastic-rubber base.
  - 2. Rubber molding accessories.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: Contractor shall provide manufacturer's color PDF images of acoustical ceiling panels and suspension system for review & approval. Actual samples are NOT required unless specifically requested by the architect/interior designer.
- C. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

#### 1.4 MAINTENANCE MATERIAL SUBMITTALS

- 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 not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

#### 1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Coordinate mockups in this Section with mockups specified in other Sections.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

## 1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
  1. 48 hours before installation.
  2. During installation.
  3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. FloorScore Compliance: Resilient base and stair accessories shall comply with requirements of FloorScore certification.
- B. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

### 2.2 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, the following manufacturers' products may be incorporated into the Work:
  1. Basis of Design:
    - a. Tarkett – Johnsonite.
  2. Approved Manufacturers:

- a. Roppe Corporation, USA.

## 2.3 THERMOPLASTIC-RUBBER BASE (RB)

- A. Product Standard: ASTM F1861, Type TP (rubber, thermoplastic).
  - 1. Group: 1 (solid, homogeneous)
- B. Style: B, Cove with top-set toe.
- C. Thickness: 0.125 inch.
- D. Height: Provide 4-inch-high base in all other areas indicated.
- E. Lengths: Coils in manufacturer's standard length but not less than 96 feet.
- F. Outside Corners: Job-formed.
- G. Inside Corners: Job-formed.
- H. Surface: Smooth.
- I. Colors: Refer to drawings

## 2.4 RUBBER MOLDING ACCESSORY

- A. Description: Rubber nosing, cove caps, edging, reducers, joiners and transition strips.
- B. Profile and Dimensions: As indicated on drawings.
- C. Locations: Provide rubber molding accessories in areas indicated below:
  - 1. Transition Strips, Reducers and Adaptors.
- D. Colors and Patterns: Refer to drawings.

## 2.5 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
  - 1. Adhesives shall have a VOC content of 50 g/L or less
  - 2. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are the same temperature as the space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

### 3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.



- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
  - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
    - a. Form without producing discoloration (whitening) at bends.
  - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
    - a. Miter corners to minimize open joints.

### 3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

### 3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
  - 1. Remove adhesive and other blemishes from exposed surfaces.
  - 2. Sweep and vacuum horizontal surfaces thoroughly.
  - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513



## SECTION 096519 - RESILIENT TILE FLOORING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Vinyl Composition Tile.
- B. Related Sections include the following:
  - 1. Division 3 Section "Hydraulic Cement Underlayment" for Self-Leveling Underlayment.
  - 2. Division 3 Section "Cast-in-Place Concrete" for Moisture Vapor Reduction Admixture.
  - 3. Division 9 Section "Resilient Base and Accessories" for resilient wall and accessories installed with resilient tile.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Attendees: The Installer and representatives as well as senior technician of manufacturers and fabricators involved in, or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.
- B. Review methods and procedures related to resilient flooring including, but not limited to, the following:
  - 1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
  - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 3. Review special designs and patterns.

#### 1.4 ACTION SUBMITTALS

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

- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 1. Show details of special patterns.
- C. Product Schedule: For floor tile. Use same designations indicated on Drawings.
- D. Samples: Contractor shall provide manufacturer's color PDF images of resilient flooring for review & approval. Actual samples are NOT required unless specifically requested by the architect/interior designer.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Floor Tile: Furnish one box for every 60 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

#### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
  - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Coordinate mockups in this Section with mockups specified in other Sections.
    - a. Size: Minimum (1) classroom for each type, color, and pattern in locations directed by Architect.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F Store floor tiles on flat surfaces.

#### 1.10 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F in spaces to receive floor tile during the following time periods:
  1. 48 hours before installation.
  2. During installation.
  3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
  1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

#### 2.4 Vinyl Composition Tile (VCT)

- A. Products: Subject to compliance with requirements, provide one of the following:
  1. Manufacturer: Tarkett
  2. Series: VCT II

3. Tile Standard: ASTM F 1066, Class 2, through-pattern.
4. Thickness: 0.125
5. Wear Surface: Smooth
6. Size: 12 inches by 12 inches.
7. Color: 328 Palm and 501 Almond.

## 2.5 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile, conductivity and substrate conditions indicated unless noted otherwise. Product cannot void any portion of the manufacturer's standard warranty.
  1. Adhesives shall comply with the following limits for VOC content:
    - a. Adhesives: 50 g/L or less.
  2. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
  3. Provide adhesive for the following substrates:
    - a. Substrates without moisture vapor reduction admixture: Porous Adhesive.
    - b. Substrates with moisture vapor reduction admixture: Non-Porous Adhesive.
  4. Vinyl Composition Tile Adhesives: Per manufacturer's recommendations.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by the floor tile manufacturer for VCT.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

- C. Receive Resilient Tile Floor Manufacturer's written approval of substrate required before installation of any tile flooring. The Carpet and Resilient Tile Contractor is responsible for obtaining the Resilient Tile Flooring Manufacturer's written approval of the floor as an acceptable substrate for the installation of manufacturer's tile product specified. If the floor is not acceptable to the manufacturer, the general contractor is responsible for preparing the floor to receive the new tile, as specified in order paragraphs of this specification, including an underlayment or leveling compound where necessary to meet all requirements for a manufacturer's approval of the substrate.

### 3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
  - 4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
    - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  - 1. Lay tiles in pattern indicated.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles with grain running in one direction.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
  - 1. Remove adhesive and other blemishes from exposed surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.
  - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.



- D. Sealers and Finish Coats: Remove soil, visible adhesive, and surface blemishes from resilient floor tile surfaces before applying liquid cleaners, sealers, and finish products.
  - 1. Sealer: Apply (2) coats of liquid floor polish to all VCT.
  - 2. Finish: Apply (4) coats of liquid floor polish to all VCT.
  
- E. Cover floor tile until Substantial Completion.

END OF SECTION 096519



## SECTION 096813 - TILE CARPETING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes:
  - 1. Modular carpet tile.
- B. Related Requirements:
  - 1. Division 3 Section "Hydraulic Cement Underlayment" for Self-Leveling Underlayment.
  - 2. Division 9 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

#### 1.3 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
  - 1. Attendees: The Installer and representatives as well as senior technician of manufacturers and fabricators involved in, or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.
  - 2. Review methods and procedures related to resilient flooring including, but not limited to, the following:
    - a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
    - b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - c. Review special designs and patterns.
    - d. Review delivery, storage, and handling procedures.
    - e. Review ambient conditions and ventilation procedures.
    - f. Review subfloor preparation procedures.

#### 1.4 ACTION SUBMITTALS

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

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include installation recommendations for each type of substrate.

B. Shop Drawings: Show the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples: Contractor shall provide manufacturer's color PDF images of carpet tile for review & approval. Actual samples are NOT required unless specifically requested by the architect/interior designer.

D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
  1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Carpet Tile: Full-size units equal to 3 percent of amount installed for each type indicated, but not less than 10 sq. yd.

## 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floor covering Installers Association at the Master II certification level.
- B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
  - 1. Coordinate mockups in this Section with mockups specified in other Sections.
    - a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104.

## 1.10 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

## 1.11 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, and delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 CARPET TILE (CPT1)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the following:

1. Manufacturer: Shaw Contract
2. Collection: Places
3. Style: 5T176 Central Line Tile
4. Color: 72558 Urban Blue
5. Size: 9 inches by 36 inches
6. Backing: EcoWorx Tile
7. Installation: Ashlar

### 2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation on porous and non-porous surfaces.
1. Substrates without moisture vapor reduction admixture: Porous Adhesive.
  2. Substrates with moisture vapor reduction admixture: Non-Porous Adhesive.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
  2. Subfloor finishes comply with requirements specified in Division Section 3 "Cast-in-Place Concrete" for slabs receiving carpet tile.
  3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- D. For wood subfloors, where occur, verify the following:
1. Underlayment over subfloor complies with requirements specified in Division Section 6 "Rough Carpentry."
  2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### 3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
  1. Carpet installation shall begin at the center point of the room and work out to the perimeter walls. Installation pattern to be ashlar.

- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.

### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813



## SECTION 099123 – PAINTING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.
  - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will supply a color selection.
  - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
  - 1. Prefinished items include the following factory-finished components:
    - a. Architectural woodwork.
    - b. Acoustical wall panels.
    - c. Metal toilet enclosures.
    - d. Metal lockers.
    - e. Unit kitchens.
    - f. Elevator entrance doors and frames.
    - g. Elevator equipment.
    - h. Light fixtures.
  - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
    - a. Foundation spaces.
    - b. Furred areas.
    - c. Ceiling plenums.
    - d. Utility tunnels.
    - e. Pipe spaces.
    - f. Duct shafts.
    - g. Elevator shafts.
  - 3. Finished metal surfaces include the following:

- a. Anodized aluminum.
  - b. Stainless steel.
  - c. Chromium plate.
  - d. Copper and copper alloys.
  - e. Bronze and brass.
4. Operating parts include moving parts of operating equipment and the following:
- a. Valve and damper operators.
  - b. Linkages.
  - c. Sensing devices.
  - d. Motor and fan shafts.
5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Requirements:

1. Division 5 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 2 Section "Cement Concrete Pavement" for traffic-marking paint.
3. Division 5 Section "Structural Steel" for shop priming structural steel.
4. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
5. Division 6 Section "Architectural Woodwork" for shop priming interior architectural woodwork.
6. Division 8 Section "Hollow Metal Doors and Frames" for factory priming steel doors and frames.
7. Division 9 Section "Gypsum Board Assemblies" for surface preparation of gypsum board.

### 1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

### 1.4 SUBMITTALS

A. Product Data: For each paint system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification. Submit in same format as specification.

2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
  3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's).
- B. Colors: Match Architect's color selections.
- C. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
1. Submit 4 sets of samples of each final color and finish.
- D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to be demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Certifications:
1. Furnish a letter from the paint manufacturer or their factory representative certifying that the paint system proposed for this project are equal to or better than the specified systems in appearance and performance levels. Submit proof of equivalency for approval including generic type, descriptive information, VOC content, performance data, solids by volume, and recommended film thickness. Submittals not accompanied by this certification will be returned, "REJECTED."
- F. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

## 1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.
- C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.
1. Architect will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.
    - a. Provide mock up of first and second coats of block filler or primer for approval of application.

- b. Wall Surfaces: Provide samples on at least 100 sq. ft.
  - c. Small Areas and Items: Architect will designate items or areas required.
- D. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface. Where materials are being applied over previously painted surfaces, apply mock up samples and perform field testing to check for compatibility, adhesion, and film integrity of the new materials to existing painted surfaces. Report in writing any condition that may affect application, appearance, or performance of the specified coating system.
- 1. After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature.
  - 2. Final approval of colors will be from benchmark samples.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
- 1. Product name or title of material.
  - 2. Product description (generic classification or binder type).
  - 3. Manufacturer's stock number and date of manufacture.
  - 4. Contents by volume, for pigment and vehicle constituents.
  - 5. Thinning instructions.
  - 6. Application instructions.
  - 7. Color name and number.
  - 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers 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.
- C. 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 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to 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 manufacturer during application and drying periods.

## 1.8 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver left-over paint materials to Owner.
  1. Quantity: Furnish Owner with extra paint materials in quantities indicated below:
    - a. Exterior: 2 gallons of each color applied.
    - b. Interior: 1 case of each color applied.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, provide products from one of the following manufacturers. Sherwin-Williams is the basis of design and establishes the standard of quality required.
- B. Manufacturers' Names:
  1. Sherwin Williams (SW).
  2. Glidden.
  3. PPG.
  4. Benjamin Moore.

### 2.2 PAINT MATERIALS, GENERAL

- A. 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. Each system should be from the same manufacturer.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-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 manufacturer's material data and certificates of performance for proposed substitutions.
- C. Colors: Match Architect's samples.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.
  - 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
  - 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
  - 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
- C. Where materials are being applied over previously painted surfaces, apply mock up samples and perform field testing to check for compatibility, adhesion, and film integrity of the new materials to existing painted surfaces. Report in writing any condition that may affect application, appearance, or performance of the specified coating system.

### 3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning. All surfaces must be clean, dry, and free of all oil, grease, surface contaminants, and substances that could impair adhesion.
  - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
  - 2. All previously coated surfaces shall clean, dry, dull, and in sound condition prior to coating. All loose paints (either visible or not) shall be removed to expose a sound surface for repainting. All smooth, glossy surfaces shall be abraded to impart a surface profile that will promote adhesion of the subsequent coating system. A test-patch shall be applied prior to a full installation to assure adequate adhesion will be achieved.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
  - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
  - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
3. For Concrete Floors:
  - a. Surface must be clean, dry, and in sound condition. Remove stains, oil, dust, grease, dirt, rust, release agents, curing compounds and hardeners, salts, efflorescence, laitance, and other contaminants and foreign material to ensure adequate adhesion.
  - b. Follow recommendations as listed in the Sherwin Williams / General Polymers G-1 Surface Preparation Guide and ICRI Guideline #310-2-1997 for surface preparation.
  - c. Provide Concrete Surface Profile (CSP) as recommended by manufacturer for specified systems.
  - d. Determine alkalinity and moisture content of surfaces by performing appropriate tests. Document results in writing to GC and architect.
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 applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
    - 1) Existing Wood: Scuff-sand/mechanically abrade the existing finish to impart a surface profile followed by thorough cleaning with a commercial cleaner/degreaser to remove all surface contaminants and rinse thoroughly.
  - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
  - c. If transparent finish is required, back-prime with spar varnish.
  - d. Back-prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
  - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
5. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.

- a. Power Tool Clean steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 3.
  - b. Treat bare 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 paint manufacturer, and touch up with same primer as the shop coat.
- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
  2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
  3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

### 3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
  2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
  3. Provide finish coats that are compatible with primers used.
  4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
  5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
  7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
  9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
  10. Sand lightly between each succeeding enamel or varnish coat.



- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
  2. Omit primer over metal surfaces that have been shop primed and touchup painted.
  3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
  4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
  2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
  3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- F. Mechanical items to be painted include, but are not limited to, the following:
1. Exposed uninsulated metal piping.
  2. Exposed uninsulated plastic piping.
  3. Exposed pipe hangers and supports.
  4. Tanks that do not have factory-applied final finishes.
  5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
  6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
  7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
- G. Electrical items to be painted include, but are not limited to, the following:
1. Switchgear.
  2. Panel boards.

3. Electrical equipment that is indicated to have a factory-primed finish for field painting.
- H. All interior and exterior exposed gypsum wallboard, including any bulkheads and soffits to be painted.
  - I. All interior and exterior ferrous metal to be painted including any lintels, railings, grilles, and louvers (does not include factory or pre-finished items).
  - J. All hollow metal doors and frames, interior and exterior, shall be painted.
  - K. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
  - L. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that 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 ensure a finish coat with no burn-through or other defects due to insufficient sealing.
  - M. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque 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.
  - N. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
    1. Provide satin finish for final coats.
  - O. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.
  - P. Marking and Identification: Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:
    1. Be located in accessible concealed floor, floor-ceiling or attic spaces;
    2. Be repeated at intervals not exceeding 30 feet measured horizontally along the wall or partition; and
    3. Include lettering not less than 0.5 inch in height, incorporating the suggested wording: "FIRE AND/OR SMOKE BARRIER-PROTECT ALL OPENINGS," or other wording.
      - a. Exception: Walls in Group R-2 occupancies that do not have a removable decorative ceiling allowing access to the concealed space.
- 3.4 FIELD QUALITY CONTROL
- A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:

1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:
  - a. Quantitative material analysis.
  - b. Abrasion resistance.
  - c. Apparent reflectivity.
  - d. Flexibility.
  - e. Washability.
  - f. Absorption.
  - g. Accelerated weathering.
  - h. Dry opacity.
  - i. Accelerated yellowness.
  - j. Recoating.
  - k. Skinning.
  - l. Color retention.
  - m. Alkali and mildew resistance.
3. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

**B. Pre-installation Meetings:**

1. Schedule a conference and inspection to be held on-site before field application of coating systems begins.
2. Conference shall be attended by Contractor, Owner's representative, Engineer, Construction Manager, coating applicators, and a representative of coating material manufacturer.
3. Topics to be discussed at meeting shall include:
  - a. A review of Contract Documents and accepted shop drawings shall be made and deviations or differences shall be resolved.
  - b. Review items such as environmental conditions, surface conditions, surface preparation, application procedures, and protection following application.
  - c. Establish which areas on-site will be available for use as storage areas and working area
4. Pre-construction conference and inspection shall serve to clarify Contract Documents, application requirements and what work should be completed before coating application can begin.
5. Prepare and submit, to parties in attendance, a written report of pre-installation conference report shall be submitted with 3 days following conference.
6. Field Samples:
  - a. Provide a full coating system to the required sheen, color, texture, and

recommended coverage rates. Simulate finished lighting conditions for reviewing in-place work.

7. The Architect, Construction Manager or Owners Representative will select one room, area, or combination of areas and surfaces and conditions for each type of coating and substrate to be coated. Apply coatings in this room, area, combination of areas and surfaces according to the schedule, or as specified. After finishes are accepted, this room, area or combination of areas and surfaces will serve as the standard of quality and for evaluation of coating systems of similar nature.
8. A manufacturer's representative shall be available upon request by the General Contractor or Painting subcontractor, to advise applicator on proper application technique and procedures.

### 3.5 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
  1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

### 3.6 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
  1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

### 3.7 EXTERIOR PAINT SCHEDULE

- A. Previously Painted Exterior Wood (Painted Finish): Provide the following finish systems over previously painted exterior wood surfaces. \*Note: Mock-Up with adhesion test per ASTM-D3359 is required prior to installation of this system.
  1. Semi-Gloss Acrylic-Enamel Finish: two finish coats over an adhesion promoting primer.
    - a. Spot Primer (any bare surfaces): Exterior Latex Wood Primer, B42W8041.
    - b. Primer: Extreme Bond Primer, B51-150 series.
    - c. Finish Coats: Solo 100% Acrylic Int./Ext. Semi-Gloss, A76 series.

### 3.8 INTERIOR PAINT SCHEDULE

- A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:
  1. Flat Acrylic Finish (Ceiling and Bulkhead Applications): Two finish coats over a primer.

- a. Primer: SW, ProMar 200 Zero VOC Latex Primer, B28W600.
    - b. Finish Coat: SW, ProMar 200 Zero VOC Latex Flat, B30W2650 series.  
*\*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.*
  - 2. Low Luster Acrylic-Enamel Finish (Wall Application @ Administration): Two finish coats over a primer.
    - a. Primer: SW, ProMar 200 Zero VOC Latex Primer, B28W600.
    - b. Finish Coats: SW, ProMar 200 Zero VOC Latex Eg-Shel, B20W2650 series.  
*\*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.*
  - 3. Semi-Gloss Acrylic-Enamel Finish (Wall Application): Two finish coats over a primer.
    - a. Primer: SW, ProMar 200 Zero VOC Latex Primer, B28W600.
    - b. Finish Coats: SW, ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series.  
*\*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.*
- B. Previously Painted Gypsum Board: Provide the following finish systems over previously painted interior gypsum board surfaces. *\*Note: Mock-Up with adhesion test per ASTM-D3359 is required prior to installation of this system.*
- 1. Flat Acrylic Finish (Ceiling & Bulkhead Application): Two finish coats over an adhesion promoting primer.
    - a. Primer: SW, Extreme Bond Interior/Exterior Bonding Primer, B51-150.
    - b. Finish Coats: SW, ProMar 200 Zero VOC Latex Flat, B30W2650 series.  
*\*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.*
  - 2. Low Luster Acrylic-Enamel Finish (Wall Application @ Administration): Two finish coats over an adhesion promoting primer.
    - a. Primer: SW, Extreme Bond Interior/Exterior Bonding Primer, B51-150.
    - b. Finish Coats: SW, ProMar 200 Zero VOC Latex Eg-Shel, B20W2650 series.  
*\*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.*
  - 3. Semi-Gloss Acrylic-Enamel Finish (Wall Application): Two finish coats over an adhesion promoting primer.
    - a. Primer: SW, Extreme Bond Interior/Exterior Bonding Primer, B51-150.
    - b. Finish Coats: SW, ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series.  
*\*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.*
- C. Plaster – Latex System: Provide the following finish systems over interior plaster surfaces:
- 1. Flat Acrylic Finish (Ceiling & Bulkhead Application): Two finish coats over a primer.
    - a. Primer: Loxon Concrete & Masonry primer, A24W8300
    - b. Finish Coats: ProMar 200 Zero VOC Latex Flat, B30W2650 series  
*\*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.*
  - 2. Low Luster Acrylic-Enamel Finish (Wall Application @ Administration): Two finish coats over a primer.

- a. Primer: Loxon Concrete & Masonry primer, A24W8300
  - b. Finish Coats: ProMar 200 Zero VOC Latex Eg-Shel, B20W2650 series
  - c. \*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.
3. Semi-Gloss Acrylic-Enamel Finish (Wall Application): Two finish coats over a primer.
- a. Primer: Loxon Concrete & Masonry primer, A24W8300
  - b. Finish Coats: ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series  
\*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.
- D. Previously Painted Plaster: Provide the following finish systems over previously painted interior gypsum board surfaces. \*Note: Mock-Up with adhesion test per ASTM-D3359 is required prior to installation of this system.
1. Flat Acrylic Finish (Ceiling & Bulkhead Application): Two finish coats over an adhesion promoting primer.
- a. Primer: Extreme Bond Primer, B51-150 series
  - b. Finish Coats: ProMar 200 Zero VOC Latex Flat, B30W2650 series  
\*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.
2. Low Luster Acrylic-Enamel Finish (Wall Application @ Administration): Two finish coats over an adhesion promoting primer.
- a. Primer: Extreme Bond Primer, B51-150 series
  - b. Finish Coats: ProMar 200 Zero VOC Latex Eg-Shel, B20W2650 series  
\*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.
3. Semi-Gloss Acrylic-Enamel Finish (Wall Application): Two finish coats over an adhesion promoting primer.
- a. Primer: Extreme Bond Primer, B51-150 series
  - b. Finish Coats: ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series  
\*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.
- E. Ferrous Metal: Provide the following finish systems over ferrous metal:
1. Semi-Gloss Finish: Two finish coats over a primer.
- a. Primer: SW, Pro-Industrial Pro-Cryl Universal Metal Primer, B66-310 series.
  - b. Finish Coats: SW, Pro-Industrial Waterbased Catalyzed Epoxy Gloss.
- F. Previously Painted Ferrous Metal: Provide the following finish systems over previously painted ferrous metal. \*Note: Mock-Up with adhesion test per ASTM-D3359 is required prior to installation of this system.
1. Semi-Gloss Finish: Two finish coats over an adhesion promoting primer.
- a. Spot Primer (for bare or rusty areas): SW, Pro-Industrial Pro-Cryl Universal Metal Primer, B66-310 series
  - b. Primer: SW, Extreme Bond Interior/Exterior Bonding Primer, B51-150.

- c. Finish Coats: SW, Pro-Industrial Waterbased Catalyzed Epoxy Gloss.
  
- G. Previously Painted Concrete Masonry Units: Provide the following finish systems over an adhesion promoting primer for wall applications. *\*Note: Mock-Up with adhesion test per ASTM-D3359 is required prior to installation of this system.*
  - 1. Semi-Gloss Finish: Two finish coats over a primer.
    - a. Primer: SW, Extreme Bond Interior/Exterior Bonding Primer, B51-150.
    - b. Finish Coats: SW, ProMar 200 Zero VOC Latex Semi-Gloss, B31W2650 series.  
*\*Zero VOC, Anti-Microbial, \*Product remains Zero VOC when tinted.*
  
- H. Previously Painted Wood: Provide the following finish systems over previously painted wood paneling and/or trim. *\*Note: Mock-Up with adhesion test per ASTM-D3359 is required prior to installation of this system.*
  - 1. Semi-Gloss Finish: Two finish coats over a filler.
    - a. Primer: SW, Extreme Bond Interior/Exterior Bonding Primer, B51-150.
    - b. Finish Coats: SW, Pro Industrial PreCatalyzed Waterbased Epoxy Semi-Gloss, K46-1150 series.

END OF SECTION 099123





## SECTION 101100 - VISUAL DISPLAY UNITS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Porcelain enamel marker boards with aluminum frames.
  - 2. Vinyl-faced cork tack boards with aluminum frames.
  - 3. Wrapped vinyl-faced cork tack boards (Frameless).
  - 4. Tack strips and display rails with aluminum frames.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of visual display board indicated.
- B. Shop Drawings: For each type of visual display board required.
  - 1. Include dimensioned elevations. Show location of joints between individual panels where unit dimensions exceed maximum panel length.
  - 2. Include sections of typical trim members.
  - 3. Show anchors, grounds, reinforcement, accessories, layout, and installation details.
  - 4. Where occurs, Contractor shall verify the existing board dimensions to ensure new visual display boards cover extent of existing boards.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and textures available for the following:
  - 1. Markerboards: Actual sections of porcelain enamel finish for each type of marker board required.
  - 2. Vinyl-Faced Cork Tackboards: Samples for each type of vinyl- faced cork tack board indicated.
  - 3. Tack Strips and Display Rails: Samples for each type of cork required.
- D. Product Certificates: Signed by manufacturers of tack boards certifying that vinyl-faced materials furnished comply with requirements specified for flame-spread ratings.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of marker board manufacturer for both installation and maintenance of the type of sliding marker board units required for this Project.
- B. Source Limitations: Obtain visual display boards through one source from a single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of visual display boards and are based on the products indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Fire-Test-Response Characteristics: Provide vinyl- and fabric-faced tackboards with the following surface-burning characteristics as determined by testing assembled materials composed of facings and backings identical to those required in this Section per ASTM E 84 by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify vinyl- and fabric-faced tack boards with appropriate markings of applicable testing and inspecting agency.
  - 1. Flame Spread: 25 or less.
  - 2. Smoke Developed: 10 or less.
- E. Field Measurements: Verify field measurements before preparation of Shop Drawings and before fabrication to ensure proper fitting. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

## 1.5 WARRANTY

- A. Special Warranties: As follows:
  - 1. Writing Surface: Manufacturer's standard, written, material warranty agreeing at manufacturer's option to repair or replace the original boards if they do not retain their original writing and erasing qualities, gloss variance, or color consistency under normal usage and maintenance, without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Warranty does not include the cost of removal or reinstallation.
    - a. Term of Warranty: Limited lifetime warranty.
  - 2. Workmanship and Materials: Manufacturer's standard, written, material replacement warranty agreeing at manufacturer's option to repair or replace any products which, under normal usage and maintenance, show defects in workmanship or materials,

without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Warranty does not include the cost of removal or reinstallation.

- a. Term of Warranty: 10 years from date of Substantial Completion.

## PART 1 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
  1. Basis of Design:
    - a. AARCO
  2. Approved Manufacturers:
    - a. Claridge Products and Equipment, Inc.

### 2.2 MATERIALS FOR MARKER BOARD PANELS

- A. Writing Surface Facing Sheet: Provide "E-3" surface.
  1. Enameling grade cold-rolled steel, manufactured from a minimum of 30 percent post-consumer and post-industrial waste, .016 inch thick for all pre-framed boards without joints. All face sheets shall be .025 inch thick for boards with spline joints and have the same content as .016 inch thick face sheets.
  2. Writing surfaces shall consist of the following characteristics:
    - a. All coatings shall contain less than a combined total of less than 0.1 percent of heavy metals cadmium, mercury, hexavalent chromium, and lead.
    - b. All coatings shall be free of arsenic and antimony as well as volatile organic compounds.
    - c. Writing surface face sheet shall be 99 percent recyclable.
    - e. Marker board 80 to 85 percent gloss (low-gloss surface), recommended for projection. Wet cleaning required if used as a marker surface.
    - f. Facing Sheet Coatings:
      1. Face Coat: 1.7 to 2.5 mils minimum thickness enameled ground coat.
      2. Cover Coat: 3.0 to 4.0 mils enameled color coat.
      3. Back Coat: 1.7 to 2.5 mils enameled minimum ground coat.
      4. Firing Temperatures: 1,475 to 1,500 deg F, minimum.
    - g. Color(s): As selected by the Architect from the manufacturer's range of standard colors.

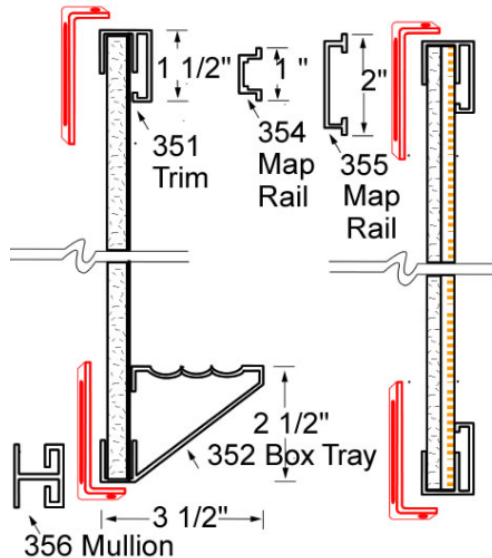
- B. Writing Surface Core:
  - 1. Core: Minimum 7/16 inch thick, particleboard core material complying with requirements of ANSI A208.1, Grade 1-M-1.
  - 2. Backing Sheet: Manufacturer's standard; moisture-blocking backing, 0.015 inch thick; recyclable; factory-laminated to core material.
  - 3. Laminating Adhesive: Manufacturer's standard, moisture-resistant, thermoplastic-type adhesive.
  
- C. Lamination: Factory-machine-type only.

### 2.3 MATERIALS FOR TACK BOARD PANELS

- A. Core: Composed of 100 percent post-consumer and post-industrial waste, or 100 percent naturally-sustainable; 1/4-inch fiberboard laminated to 1/4-inch natural cork.
  
- B. Coverings:
  - 1. 100 percent naturally-sustainable.
  - 2. Covering Materials: Provide the following, as indicated:
    - a. Framed Tack Boards:
      - i. Manufacturer: Koroseal or Equal
      - ii. Series: Harborweave II
      - iii. Fabric: 21-ounce-per-linear-yard vinyl
      - iv. Backing: Woven 80/20 Type II
      - v. Flammability: ASTM E84 Class A/Class 1.
      - vi. Cleaning: Water/Solvent and Bleach Cleanable.
      - vii. Width: 53/54 inches
      - viii. Colors: As selected by the Architect from the manufacturer's range of standard colors. Provide a minimum of (21) colors.
  
    - b. Fabric-Wrapped Tack Boards (Frameless):
      - i. Manufacturer: Carnegie-Xorel
      - ii. Series: Meteor.
      - iii. Fabric: 16-oz-per-linear-yard, 100% IRP Xorel.
      - iv. Backing: X-Protect Wall microvent.
      - v. Flammability: ASTM E84 Class A/Class 1.
      - vi. Cleaning: Water/Solvent and Bleach Cleanable.
      - vii. Width: 52 inches
      - viii. Colors: As selected by the Architect from the manufacturer's range of standard colors. Provide a minimum of (80) colors.

### 2.4 ACCESSORIES

- A. Metal Trim and Accessories: Fabricate frames and trim of not less than 0.062-inch thick, extruded-aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single-length units. Miter corners to a neat, hairline closure.
1. Field-Applied Trim: Manufacturer's standard snap-on trim with no visible fasteners or exposed joints.
    - a. Location: All visual display boards unless noted otherwise.
    - b. Profile: Arco, 10-350 RF Series.



2. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
- B. Map Rails: Furnish map rail at top of each marker board with rail length equaling length of marker board. In instances where tack boards are located adjacent to marker board, display rail should equal length of marker boards and tack boards. Each display rail on marker boards shall be complete with the following accessories:
1. Display Rail: Provide continuous cork display rail, approximately 2 inches wide integral with map rail.
  2. End Stops: Provide one end stop at each end of map rail.
  3. Map Hooks: Provide 2 metal map hooks for every 48 inches of map rail or fraction thereof.
  4. Flag Holder: Provide one flag holder for each room.
  5. Metal Roller Brackets: Provide one pair for each room.
  6. Colors: As selected by Architect from manufacturer's full range of colors. Provide a minimum of (15) color selections.

## 2.5 FABRICATION

- C. Porcelain Enamel Marker Boards: Laminate facing sheet and backing sheet to core material under pressure with manufacturer's recommended flexible, waterproof adhesive.
- D. Vinyl-faced Cork Tack Boards: Vinyl fabric and backing sheet to core material under pressure with manufacturer's recommended flexible, waterproof adhesive.
- E. Vinyl-Faced Wrapped Tackboards (Frameless): Tackboards shall have vinyl fabric tightly wrapped around all edges and securely adhered to the back of the fiberboard. Refer to Drawings for locations.
- F. Assembly: Provide factory-assembled marker board and tack board units, unless field-assembled units are required.
  - 1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.
    - a. Provide marker board lengths of 16'-0" wide maximum with no seams. For boards over 16' – 0", provide butt-joint at seam locations. Refer to drawings for seam locations.
  - 2. Provide manufacturer's standard mullion trim at joints between marker board and tack boards for field-applied trim units.

## 2.6 FINISHES

- G. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- H. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- I. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 607.1.

## PART 2 - EXECUTION

### 3.1 EXAMINATION

- A. Examine wall surfaces, with Installer present, for compliance with requirements and other conditions affecting installation of visual display boards.
  - 1. Surfaces to receive marker boards shall be free of dirt, scaling paint, and projections or depressions that would affect smooth, finished surfaces of marker boards.
  - 2. Surfaces to receive tack boards shall be dry and free of substances that would impair the bond between tack boards and substrate.

3. Do not proceed with installation until unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

### A. Field-applied Trim:

1. Deliver factory-built visual display boards completely assembled in one piece without joints, unless noted otherwise. If dimensions exceed panel size, refer to drawings for seam locations. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.
2. Install units in locations and at mounting heights indicated and according to manufacturer's written instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

- B. Display Rails: Install rails at mounting heights indicated on Drawings. Attach to wall surface with fasteners at not more than 16 inches o.c.

- C. Coordinate Project-site-assembled units with grounds, trim, and accessories. Join parts with a neat, precision fit.

## 3.3 ADJUSTING AND CLEANING

- A. Verify that accessories required for each unit have been properly installed and that operating units function properly.
- B. Clean units according to manufacturer's written instructions.

END OF SECTION 101100





## SECTION 101416 – PLAQUES

### 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 plaques.
- B. Related requirements:
  - 1. Division 10 Sections “Dimensional Letter Signage” for cast metal letters.
  - 2. Division 10 Section “Panel Signage” for signs, with or without frames, that are made of materials other than solid metal.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals: Refer to Division 1 Section “LEED Requirements.”
- C. Shop Drawings: For plaques.
  - 1. Include fabrication and installation details and attachments to other work.
  - 2. Show plaque mounting heights, locations of supplementary supports to be provided by others, and accessories.
  - 3. Show message list, typestyles, graphic elements, including raised characters, and layout for each plaque at least half size.
    - a. Nomenclature indicated on Contract Drawings is based on Project information at the time of Bidding. Information shall be reviewed and updated by Owner and Architect prior to final fabrication. Fabrication may occur as late as necessary in order to display as much up-to-date information as possible, but to allow adequate time for final proof, fabrication, shipping and installation.
- D. Color Brochures: High quality printed reproductions, accurately representing available finish colors and textures.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For plaques to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer of products or an entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PLAQUES

- A. Cast Plaque: Building dedication/rededication plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
  - 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:
    - a. Bayuk Graphic Systems.
    - b. Best Sign Systems.
    - c. Gemini Incorporated.
    - d. In Pro.
    - e. Matthews International Corporation; Bronze Division.
    - f. Metal Arts; Div. of L&H Mfg. Co.
    - g. 4 Sign Solutions.
  - 2. Plaque Material: Cast aluminum.
  - 3. Plaque Thickness: 0.50 inch, or as otherwise indicated.
  - 4. Finishes:
    - a. Integral Aluminum Finish: Clear anodized raised surface.
    - b. Powder-Coated Finish: Background surface, in color as selected by Architect from manufacturer's full range.
    - c. Overcoat: Clear organic coating.
  - 5. Background Texture: As selected by Architect from manufacturer's full range.
  - 6. Integrally-Cast Border Style: As indicated.
  - 7. Mounting: Concealed studs.
  - 8. Text and Typeface: Typeface as indicated, or as selected by Architect from manufacturer's full range. Finish raised characters to contrast with background color.

## 2.2 MATERIALS

- A. Aluminum Castings: ASTM B 26, alloy and temper recommended by plaque manufacturer for casting process used and for type of use and finish indicated.

## 2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard concealed fasteners and anchors as required for secure anchorage of plaques, noncorrosive and compatible with each material joined, and complying with the following:
  - 1. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque, unless otherwise indicated.

## 2.4 FABRICATION

- A. General: Provide manufacturer's standard plaques according to requirements indicated.
  - 1. Completely fabricate plaques in the shop.
  - 2. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
  - 3. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

## 2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

## 2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.
- B. Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

## 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 plaque work.
- B. Verify that plaque-support surfaces are within tolerances to accommodate plaques without gaps or irregularities between backs of plaques and support surfaces unless otherwise indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.
  - 1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
  - 2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
  - 3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.
- B. Mounting Methods:
  - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.
    - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place plaque in position and push until flush to surface, embedding studs in holes. Temporarily support plaque in position until adhesive fully sets.

### 3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed plaques and plaques that do not comply with specified requirements. Replace plaques with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as plaques are installed.
- C. On completion of installation, clean exposed surfaces of plaques according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain plaques in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101416

## SECTION 101419 - DIMENSIONAL LETTER SIGNAGE

### 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 cast and cutout dimensional characters.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals: Refer to Division 1 Section "LEED Requirements."
- C. Shop Drawings: For dimensional letter signs.
  - 1. Include fabrication and installation details and attachments to other work. Include floor plan of each building, indicating location of each sign and cross-referencing the sign schedule information.
  - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
  - 3. Show message list, typestyles, graphic elements, and layout for each sign at a scale of at least 1 inch equaling 1 foot.
- D. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
  - 1. Include representative Samples of available typestyles and graphic symbols.
- E. Samples for Verification: For each type of sign assembly showing all components and with the required finish, in manufacturer's standard size unless otherwise indicated and as follows:
  - 1. Dimensional Characters: Full-size or half-size Sample of each type of dimensional character.
  - 2. Exposed Accessories: Full-size Sample of each accessory type.
- F. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.

- B. Sample Warranty: For special warranty.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer of products or an entity that employs installers and supervisors who are trained and approved by manufacturer.

#### 1.7 FIELD CONDITIONS

- A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering.
    - b. Separation or delamination of sheet materials and components.
  - 2. Warranty Period: Five years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 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:
  - a. In Pro.
  - b. ASI Sign Systems, Inc.
  - c. Bayuk Graphic Systems, Inc.
  - d. Bunting Graphics, Inc.
  - e. Gemini Incorporated.
  - f. Metal Arts; Div. of L&H Mfg. Co.
  - g. Mohawk Sign Systems.
  - h. 4 Sign Solutions.
- B. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:

1. Character Material: Cast aluminum.
2. Character Height: As indicated.
3. Thickness: 1 inch thick, or thicker if determined by manufacturer.
4. Integral Aluminum Finish: Clear anodized.
5. Mounting:
  - a. Wall Surfaces: Projecting studs.
  - b. Roof Edges: Concealed, aluminum angles and brackets, with concealed bolts, nuts and washers as needed to anchor letters.
  - c. Other mounting requirements, as specifically detailed on Drawings.
6. Typeface: Arial Font, unless otherwise indicated.

C. Cutout Characters: Characters with uniform faces; square-cut, smooth, eased edges; precisely formed lines and profiles; and as follows:

1. Character Material: Sheet or plate aluminum.
2. Character Height: As indicated.
3. Thickness: 0.25 inch.
4. Integral Aluminum Finish: Clear anodized.
5. Mounting:
  - a. Wall Surfaces: Projecting studs.
  - b. Roof Edges: Concealed, aluminum angles and brackets, with concealed adhesive or other means as necessary to anchor letters.
  - c. Other mounting requirements, as specifically detailed on Drawings.
6. Typeface: Helvetica, unless otherwise indicated.

## 2.2 DIMENSIONAL CHARACTER MATERIALS

- A. Aluminum Castings: ASTM B 26, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.
- B. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

## 2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
  1. Use concealed fasteners and anchors unless indicated to be exposed.
  2. For exterior exposure, furnish nonferrous-metal, stainless-steel or hot-dip galvanized devices unless otherwise indicated.
  3. Sign Mounting Fasteners:

- a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
  - b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
  - c. Through Fasteners: Metal fasteners only exposed to non-viewing side of letters, attached to brackets and matching sign finish, with type of head indicated, installed in predrilled holes.
- B. Adhesive: Industrial strength, high-bond type, as recommended by sign manufacturer.
  - C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.4 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
  - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
  - 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
  - 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
  - 5. Internally brace signs for stability and for securing fasteners.
  - 6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
  - 7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.
- B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
  - 1. Aluminum Brackets: Aluminum angles, plates or bars, matching finish of letters. Provide in thicknesses and dimensions as indicated, or if not indicated, as required to adequately secure and display letters. Coat surfaces that will be in contact with dissimilar metals with bituminous paint or other method to prevent galvanic action.



## 2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

## 2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

## 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 signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that electrical service is correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
  - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
  - 3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
  - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
  - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
  - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
  - b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
3. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
4. Angles, Bars and Brackets: Remove loose debris from substrate surface and install angle, bar or bracket supports in position so that signage is correctly located and aligned.

### 3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101419

## SECTION 101423 – PANEL SIGNAGE

### 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:
  - 1. Interior Panel Signs.
- B. Related Requirements:
  - 1. Division 1 Section "Temporary Facilities & Controls" for temporary Project identification signs.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- B. Shop Drawings: For panel signs, showing fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, layout, reinforcement, accessories, and installation details.
  - 1. Details: Provide message list for each type of sign required, including tpestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size. Include large-scale details of nomenclature, including layout of room names, room numbers and graphic symbols, as indicated. Elevation details shall be consistent with sign type number on Drawings.
  - 2. **Floor Plans: Provide floor plans showing locations of each sign, indicating original room name, room number, and sign type.**
  - 3. Signage Schedule: Provide signage schedule in an editable version of Microsoft® Excel® format (.xlsx or .xls) or similar, compatible software. Arrange per building, building floor and building area, in a sequential manner that is consistent with the Drawings. Each room shall consist of a horizontal line of information, which shall intersect with vertical columns, in which applicable information may be input into each cell. Provide the following column heading information, which may be abbreviated as needed, formatted from left to right:
    - a. Original Room Number: As indicated on Contract Drawings.
    - b. Original Room Name: As indicated on Contract Drawings.
    - c. Revised Room Number: Final information to be fabricated; any revisions shall be input by the Architect.
    - d. Revised Room Name: Final information to be fabricated; any revisions shall be input by the Architect.

- e. Sign Type: To cross-reference Shop Drawing elevation details.
  - f. Sign Size: To indicate overall sign width and height.
  - g. Accessibility: To include International Symbol of Access (ISA).
  - h. Female: To include International Symbol for Female Gender.
  - i. Male: To include International Symbol for Male Gender.
  - j. Neutral: To include International Symbol for Gender-Neutral.
  - k. Family: To include International Symbol for Family.
  - l. Miscellaneous: To include, and make reference to, additional graphic symbols, including, but not limited to, directional arrows, stairs, and fire, as well as other signage features, such as paper inserts and sliding vacant/in use types.
  - m. Quantity: Indicate number of same panel sign design required for specific room; provide additional lines for rooms that are to have more than one sign, but require different design or sign type.
  - n. Remarks: For providing additional notes or remarks; by manufacturer (in black font color), Contractor (in green font color) or Architect (in red font color).
4. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
- 1. Cast Acrylic Sheet: Manufacturer's color Samples consisting of actual sections or chips of material, including the full range of standard colors, patterns and textures available.
  - 2. Panel Signs: (1) Full-size Sample, not less than 12 inches square, including corners, for verification of basic design.
  - 3. Exposed Accessories: Full-size Sample of each accessory type.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Sample Warranty: For special warranty.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.
- B. Single-Source Responsibility: For each separate sign type required, obtain signs from one

source of a single manufacturer.

- C. Design Concept: The Drawings indicate profile and dimensional requirements of panel signs. Slight deviations in profiles and dimensions may be approved, as long as such deviations do not drastically change the design concept, as judged by the Architect. The burden of proof of equality is on the Bidder.

#### 1.7 PROJECT CONDITIONS

- A. Field Measurements: Whenever possible, and if necessary, take field measurements prior to the preparation of Shop Drawings and fabrication to ensure proper fitting. Show recorded measurements on final Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delay.

#### 1.8 WARRANTY

- A. When warranties are required, verify with Owner's counsel that warranties stated in this article are not less than remedies available to Owner under prevailing local laws.
  - 1. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
    - a. Failures include, but are not limited to, the following:
      - 1) Deterioration of finishes beyond normal weathering.
      - 2) Deterioration of embedded graphic image.
      - 3) Separation or delamination of sheet materials and components.
  - 2. Warranty Period: Five years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.2 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering panel signage products that may be incorporated in the Work include, but are not limited to, the following:
  - 1. 4Sign Solutions.
  - 2. iSigns Inc.
  - 3. Best Manufacturing.
  - 4. Bayuk Graphics.

#### 2.2 FRAMED PANEL SIGNS

- A. Cast Acrylic Sheet: ASTM D 4802; non-extruded, non-continuous-cast polymethyl methacrylate monomer (PMMA) or extruded polyvinyl chloride (PVC)-acrylic alloy sheet,

Type UVF (UV filtering); in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested according to ASTM D 790, with a minimum allowable continuous service temperature of 176 deg F, and of the following general types:

1. Opaque Sheet: Where sheet material is indicated as "opaque," provide colored, solid acrylic sheet in colors and finishes as selected from the manufacturer's full range of standard colors and textures.
  2. Colored Coatings: Use colored coatings, including inks and paints for copy and background colors that are recommended by acrylic manufacturer for optimum adherence to acrylic surface and are non-fading for the application intended.
- B. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to and compatible with the sign material and mounting surface.
- C. Framed Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
1. Construction: Fabricate smooth, flush panel surfaces, capable of remaining flat with no noticeable distortions, while subjected to installed environmental conditions, within a tolerance of plus or minus 1/16 inch, measured diagonally.
  2. Laminated Sign Panels: Permanently laminate face panels to backing sheets of material and thickness indicated using the manufacturer's standard process.
  3. Engraved Copy: Machine-engage letters, numbers, symbols, and other graphic devices into sign panel on the face indicated to produce precisely formed copy, incised to uniform depth. Use high-speed cutters mechanically linked to master templates in a pantographic system or equivalent process capable of producing characters of the style indicated with sharply-formed edges.
    - a. Copy Depth: Character, graphic and Braille copy shall be raised 1/32 inch, unless otherwise indicated.
    - b. Lettering Style: Upper- and lower-case letters; as selected by Architect from manufacturer's full range of standard typefaces.
  4. Characters and Graphics: Unless otherwise indicated, fabricate signs with 1-inch-high room numbers and 3/4-inch-high room identification lettering. Standard grade Braille shall be located 1/2 inch below copy.
    - a. Accessibility Standards: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs. All signage shall comply with accessibility requirements, including International Symbol of Access, Braille, and provisions for mounting.
    - b. Final room numbering and verbiage designations for all signs shall be approved by Owner prior to fabrication.
  5. Edge Condition: Square, non-beveled.
  6. Edge Color: Same as background.
  7. Frame Material: Plastic
  8. Corner Condition: Square, non-rounded.
  9. Sign Types: Refer to drawings.
  10. Extra Signs: Provide an additional quantity of (5) 8"x8".

11. Locations: Refer to drawings for sign types and schedule.
- D. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.
1. Signs shall consist of internationally-adopted graphic silhouette symbols indicating entrances to male, female, gender-neutral, and family restrooms, as well as handicapped-accessibility, where occurs.
  2. Provide signs at the entrances of all non-accessible restrooms that graphically indicate the directions to the nearest handicapped-accessible restrooms.
- E. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:
1. For snap-in changeable inserts beneath removable face sheet, furnish one suction or other device to assist in removing face sheet. Furnish initial changeable insert. Furnish two blank inserts for each sign for Owner's use.
  2. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert.

## 2.3 FINISHES

- F. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide colors as selected by the Architect from the manufacturer's full range of standard colors and textures.
1. Manufacturer shall offer no less than (25) colors.

## 2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined. Use concealed fasteners and anchors unless indicated to be exposed.
- B. Adhesive: As recommended by sign manufacturer.
- C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, **0.045 inch** thick, with adhesive on both sides.

## 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 signage work.

- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
  - 1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance. All signs shall be mounted per accessibility standards, as required by the authorities having jurisdiction.
  - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
  - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
  - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Accessible Signage: Install in locations on walls as indicated on Drawings and according to the accessibility standard.
- C. Mounting Methods: Attach panel signs to surfaces, as follows:
  - 1. Interior Surfaces: Use one of the following methods, as applicable:
    - a. Vinyl-covered or Rough Surfaces: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of high-bond adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
    - b. Smooth Surfaces: Clean bond-breaking materials from substrate surface and remove loose debris. Apply two-face tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Add silicone sealant as needed. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
- D. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

### 3.3 CLEANING AND PROTECTION



- A. Remove protective coverings and strippable films as signs are installed. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until substantial completion.
- B. Touch up minor nicks and abrasions; otherwise, remove and replaced damaged or deformed signs that do not comply with requirements.

END OF SECTION 101423



## SECTION 102123 - CUBICLE TRACKS AND CURTAINS

### 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. This Section includes the following:

- 1. Cubicle curtain tracks and carriers.
- 2. Cubicle curtains.

- B. Related Requirements:

- 1. Division 6 Section "Rough Carpentry" for supplementary wood framing and blocking for mounting items requiring anchorage.
- 2. Division 9 Section "Non-Structural Metal Framing" for supplementary metal framing and blocking for mounting items requiring anchorage.

#### 1.3 SUBMITTALS

- A. Product Data including durability, fade resistance, and fire-test-response characteristics for each type of curtain fabric specified.
- B. Shop Drawings showing layout and types of cubicles, size of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.
- C. Coordination Drawings for reflected ceiling plans drawn accurately to scale and coordinating penetrations and ceiling-mounted items. Show the following:
  - 1. Ceiling suspension assembly members.
  - 2. Method of attaching cubicle curtain track hangers to building structure.
  - 3. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, and access panels.
- D. Samples: Contractor shall provide manufacturer's color PDF images of mesh and curtain fabric for review & approval. Actual samples are NOT required unless specifically requested by the architect/interior designer.
- E. Schedule of cubicles using same room designations indicated on Drawings.
- F. Product certificates signed by manufacturers of cubicle tracks and curtains certifying that their products comply with specified requirements.

- G. Maintenance data for cubicle tracks and curtains to include in the operation and maintenance manual specified in Division 1.

#### 1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements. Verify that tracks and curtains may be installed to comply with the original design and referenced standard.
- B. Space Enclosure and Environmental Limitations: Do not install tracks and curtains until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, and work above ceilings is complete.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements of the Instructions to Bidders, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Fabric:
    - a. Maharam
  - 2. Mesh:
    - a. ADC Hospital Equipment.
    - b. Construction Specialties, Inc.
    - c. Nelson, A.R. Nelson Co., Inc.

#### 2.2 CUBICLE TRACK

- A. Track: Anodized, extruded aluminum.
  - 1. Curved Track: Factory fabricated, not less than 12-inch- radius bends.
  - 2. Splicing Clamp: Of same material and finish as track.
- B. Track Mounting: Ceiling mounted; mechanically fastened to suspended ceiling grid.
  - 1. Concealed Fasteners: Stainless steel.
- C. Track Accessories: Provide end caps, connectors, end stops, coupling sleeves, wall brackets, and other accessories as required for secure and operational installation. Provide a quantity of carriers for 6-inch spacing the full length of the curtain plus 1 additional carrier.
  - 1. Carriers: Nylon rollers and axle with chrome-plated steel hook.

#### 2.3 CUBICLE CURTAINS

- A. Fabric: Provide cubicle curtain fabrics with the following characteristics:
  - 1. Fabrics are launderable to a temperature of not less than 160 deg F.
  - 2. Fabrics are flame resistant and are identical to those that have passed NFPA 701 when tested by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify fabrics with appropriate markings of applicable testing and inspecting agency.
- B. Curtain Top: Not less than 20-inch-wide nylon mesh with 1/2-inch-diameter holes. Overlap seams and double-lock stitch to body of curtain.
- C. Provide curtains fabricated to comply with the following requirements:
  - 1. Width: Equal to track length from which curtain is hung plus 10 percent, but not less than 12 inches.
  - 2. Length: Equal to floor-to-ceiling height minus 18 inches from finished ceiling at top and 12 inches above finished floor.
  - 3. Top Hem: Not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced with integral web, and double stitched.
    - a. Grommets: 2-piece, rolled-edge, rustproof, nickel-plated brass and spaced not more than 6 inches o.c.
  - 4. Bottom and Side Hems: Not less than 1 inch wide, reinforced, triple thickness, and single stitched.
  - 5. Seams: Not less than 1/2 inch wide, double turned and double stitched.
- D. Curtain Drop: PVC strip with chrome-plated steel hook.
- E. Curtain Tieback: At each termination.
- F. Operating Wand: Fiberglass baton, not less than 30 inches long.
- G. Cubicle Curtain Fabrics:
  - 1. Manufacturer: Maharam.
  - 2. Pattern: 511503 Prose
  - 3. Color: 005 Resort.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine ceilings for suitable conditions where cubicle track is to be installed.
- B. Do not proceed until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install cubicle curtain track level and plumb, according to manufacturer's written instructions and original design.
- B. Install ceiling-mounted tracks at intervals of not less than 24 inches. Coordinate track installation with ceiling grid and lighting fixtures.
- C. Install suspension-mounted tracks at intervals of not more than 48 inches. Secure ends of track to wall with flanged fittings. Fasten at each splice and the tangent point of each corner.
- D. Center fastener in track to insure unencumbered carrier operation.

### 3.3 PROTECTION

- A. Protect installed track opening with a non-residue adhesive tape to prevent debris from the ceiling finishing operation from impeding carrier operation.

END OF SECTION 102123

## SECTION 102800 - TOILET AND BATH ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Public-use restroom accessories, including childcare accessories.
  - 2. Custodial accessories.
- B. Owner-Furnished Accessories to be installed by the Contractor:
  - 1. Toilet tissue dispensers.
  - 2. Liquid soap dispensers.
  - 3. Paper towel dispensers.
- C. Related Sections include the following:
  - 1. Division 6 Section "Rough Carpentry" for wood blocking to be installed within metal wall stud cavities for support and mounting of toilet and bath accessories.
  - 2. Division 10 Section "Toilet Compartments" for partitions in which toilet accessories will be installed.

#### 1.3 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each product specified. Include the following:
  - 1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated on Drawings.
2. Identify products using designations indicated on Drawings.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

#### 1.7 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, visible silver spoilage defects.
  2. Warranty Period: 15 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 PUBLIC-USE RESTROOM AND CUSTODIAL ACCESSORIES

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from a single source, from a single manufacturer.
- B. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide toilet and bath accessories, including products indicated on Drawings, by Bobrick Washroom Equipment, Inc. or comparable products by one of the following:
  1. American Specialties, Inc.
  2. Bradley Corporation.
- C. Toilet Accessories: Basis-of-design model numbers, configurations and dimensional information, including mounting heights, as indicated on Drawings.
  1. Grab Bars: Single units as indicated on Drawings.
    - a. Mounting: Flanges with concealed fasteners.
    - b. Material: Stainless steel, 0.05 inch thick.
      - 1) Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip areas.
    - c. Outside Diameter: Approximately 1-1/4 inches.
  2. Sanitary-Napkin Disposal Units: Removable type, and as follows:



- a. Mounting: Partition-mounted, dual access or surface-mounted, as indicated on Drawings.
  - b. Basis of Design Manufacturer: Bobrick B-270
  - c. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
  - d. Material and Finish: Stainless steel, No. 4 finish (satin).
3. Mirror Units: Stainless-steel channel frame units with manufacturer's standard corners.
- a. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
    - 1) Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
4. Hat and Coat Hooks: Double-arm units, on concealed wall plate; surface-mounted.
- a. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Recessed Waste Receptacle:
- a. Basis of Design Manufacturer: Bobrick B-43644
  - b. Material and Finish: Stainless steel, No. 4 finish (satin).
6. Changing Stations: Horizontal units that open by folding down from stored position:
- a. Infant/Toddler Units:
    - 1) Basis-of-Design Manufacturer: Koala Kare Products; a division of Bobrick Washroom Equipment, Inc.
    - 2) General: Engineered to support a minimum of 250-lb. static load when opened; unit includes child-protection strap and built-in liner dispenser.
    - 3) Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
    - 4) Operation: Pneumatic shock-absorbing mechanism.
    - 5) Material and Finish: High-density polyethylene (HDPE), in manufacturer's full range of standard colors, as selected by Architect.

D. Custodial Accessories:

- 1. Mop and Broom Holders: Units with holders, and hooks beneath a shelf.
  - a. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
  - b. Material and Finish: Stainless steel, No. 4 finish (satin).
  - c. Basis-of-Design Product: Provide mop and broom holders at all custodial closets equal to Bobrick B-239x34 unless other sizes are indicated on Drawings, via basis-of-design alternative model numbers.

## 2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- C. Galvanized-Steel Sheet: ASTM A 653, with G60 hot-dip zinc coating.
- D. Galvanized-Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm.

## 2.3 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Where indicated or required for applied forces in light-gauge metal-framed walls, install fire-resistance-treated (FRT) wood blocking within cavity to ensure adequate anchoring surface and structural capacity. Refer to Division 6 Section "Rough Carpentry."
- C. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.
- D. Changing Stations: Install to withstand downward static loads as indicated.
- E. Filler Materials: Where toilet and bath accessories are to be mounted on walls that span over multiple finish materials of varying planes, including mirrors applied to ceramic tile wainscoting, install paintable filler materials, such as polyvinyl chloride (PVC) trim boards, around perimeter of accessory, flush with edges and of same thickness as finish material offset so that accessories are mounted on same plane. Paint filler material same color as adjacent finish, unless otherwise indicated.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800



## SECTION 104413 - FIRE EXTINGUISHER CABINETS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes fire protection cabinets for portable fire extinguishers.
- B. Fire Extinguishers: Existing portable fire extinguishers that are to be removed from existing construction shall be relocated to the new fire extinguisher cabinets indicated in this Section or they shall be turned over to the Owner. In the event of there being a shortage of the types or quantities of portable fire extinguishers that are required for the Project, the Owner shall furnish and locate them in new fire extinguisher cabinets or onto Owner-provided wall-mounted brackets.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
  - 1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Product Schedule: For fire protection cabinets. Coordinate final fire protection cabinet schedule with fire extinguisher schedule to ensure proper fit and function.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

#### 1.5 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to fire protection cabinets including, but not limited to, schedules and coordination requirements.

## 1.6 COORDINATION

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire protection cabinets with wall depths.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B.
- B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
  1. Sheet: ASTM B 209.
  2. Extruded Shapes: ASTM B 221.
- C. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 3 mm or 6 mm thick, with Finish 1 (smooth or polished).
- D. Acrylic Bubble: One piece.

### 2.2 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
  1. Available Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. J. L. Industries, Inc., a division of Activar Construction Products Group.
    - b. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
    - c. Larsen's Manufacturing Company.
    - d. Potter Roemer LLC.
    - e. Watrous Division, American Specialties, Inc.
- B. Cabinet Construction: Nonrated type, to only be installed in nonrated walls.
- C. Cabinet Material: Aluminum sheet on exterior, aluminum or steel sheet on interior.
- D. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.

1. Edge Trim: Either square-edge trim with 1-1/4- to 1-1/2-inch backbend depth, or rolled-edge trim with 2-1/2-inch to 4-1/2-inch backbend depth.

E. Cabinet Trim and Door Material: Aluminum sheet.

F. Door Style: Full bubble with frame.

G. Door Glazing: Molded acrylic bubble.

1. Acrylic Bubble Color: Clear transparent acrylic sheet.

H. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide projecting lever handle with cam-action or friction latch.

2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

I. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.

- a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER" applied to cabinet glazing.

- 1) Application Process: Silk-screened or pressure-sensitive vinyl letters.

- 2) Lettering Color: Red.

- 3) Orientation: Vertical.

J. Finishes:

1. Manufacturer's standard baked-enamel paint for the interior of cabinet.

2. Aluminum Trim and Doors: Clear anodic.

## 2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.

2. Provide factory-drilled mounting holes.

3. Prepare doors and frames to receive locks.

4. Install door locks at factory.

- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
  - 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
  - 2. Fabricate door frames of one-piece construction with edges flanged.
  - 3. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

#### 2.4 GENERAL FINISH REQUIREMENTS

- 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 of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

#### 2.5 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

#### 2.6 STEEL FINISHES

- A. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
  - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.



### 3.2 PREPARATION

- A. Prepare recesses for semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

### 3.3 INSTALLATION

- A. General: Install fire protection cabinets in locations and at mounting heights indicated, in compliance with requirements of authorities having jurisdiction.
- B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
  - 1. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire protection cabinets.
  - 2. Provide inside latch and lock for break-glass panels.
  - 3. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.
- C. Identification: Apply vinyl lettering at locations indicated.

### 3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.
- E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413



## SECTION 104416 – FIRE EXTINGUISHERS

### 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. Portable fire extinguishers and mounting brackets for fire extinguishers.
- B. Related Sections include the following:
  - 1. Division 10 Section "Fire Extinguisher Cabinets" for semi-recessed fire extinguisher cabinets.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product specified. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.
- C. Warranty: Sample of special warranty.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure of hydrostatic test according to NFPA 10.

- b. Faulty operation of valves or release levers.
2. Warranty Period: Six years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
  - 1. Provide fire extinguishers approved, listed, and labeled by FM Global.

### 2.2 PORTABLE FIRE EXTINGUISHERS

- A. Fire Extinguishers:
  - 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. JL Industries
    - b. Amerex Corporation
    - c. Badger Fire Protection.
    - d. Buckeye Fire Equipment
    - e. Kidde – A UTC Fire & Security Company
  - 2. Valves: Manufacturer's standard.
  - 3. Handles and Levers: Manufacturer's standard.
  - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type: **Type F.E.C.-1** UL-rated 2A–10B:C, 5 lb. nominal capacity, with a specially fluidized and siliconized mono ammonium phosphate-based dry chemical in manufacturer's standard enameled container.
  - 1. All locations except as noted otherwise.

### 2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard "J-type" galvanized steel hook, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red black baked-enamel finish. Mobile-style clamp brackets are prohibited.

- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.
  - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
  - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction and the latest version of NFPA 10 and ADAAG.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

#### 3.3 INSPECTION

- A. New fire extinguisher units shall be inspected and/or serviced by a certified (NAFED) extinguisher contractor prior to installation. An inspection tag, displaying the current year, shall be attached to the unit before installation.

END OF SECTION 104416



## SECTION 122413 - ROLLER WINDOW SHADES

### 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. Manually operated roller shades with single rollers.

- B. Related Requirements:

- 1. Division 6 Section "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
  - 2. Division 7 Section "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

#### 1.3 ACTION SUBMITTALS

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

- 1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

- C. Samples for Initial Selection: For each type and color of shadeband material.

- 1. Include Samples of accessories involving color selection.

- D. Roller-Shade Schedule: Use same designations indicated on Drawings.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Certificates: For each type of shadeband material, signed by product manufacturer.

- C. Product Test Reports: For each type of shadeband material, for tests performed by manufacturer and witnessed by a qualified testing agency.

## 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roller shades to include in maintenance manuals.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

## 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Basic of Design:
    - a. Draper Inc., Manual Flexshade.
  - 2. Approved Manufacturers:
    - a. Jacksons Window Shoppe.
    - b. Hunter Douglas Contract.



- c. Levelor Commercial.
- d. MechoShade Systems, Inc.
- e. SWF Contract.

B. Source Limitations: Obtain roller shades from single source from single manufacturer.

## 2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated. Manufacturer's standard which must comply with ANSI/WCMA A100.1, American National Standard for Safety of Corded Window Covering Products.

1. Bead Chains: Stainless steel.

a. Loop Length: Full length of roller shade.

1) Provide extra length at Room 200 Learning Support due to existing 72-inch sill height.

b. Limit Stops: Provide upper and lower ball stops.

c. Chain-Retainer Type: Chain tensioner, jamb mounted.

B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of inside face of shade

2. Direction of Shadeband Roll: Regular, from back of roller.

3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

D. Shadebands:

1. Shadeband Material: Light-filtering Series.

2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

a. Type: Enclosed in sealed pocket of shadeband material

b. Color and Finish: As selected by Architect from manufacturer's full range of colors.

E. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

a. Shape: L-shaped

- b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open, but not less than 3 inches.
  - 2. Endcap Covers: To cover exposed endcaps.
  - 3. Back Covers for Roller Shades at Interior Windows: Provide and install back cover for all interior shades.
  - 4. Installation Accessories Color and Finish: As selected from manufacturer's full range.
- F. Location: Shades to be applied to exterior applications as indicated on the Drawings; refer to reflected ceiling plans.

## 2.5 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701 Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
  - 1. Source: Mermet, T-Screen
  - 2. Type: PVC Coated polyester
  - 3. Weight: 13.83 oz per yard.
  - 4. Openness Factor: 1 percent.
  - 5. Color: As selected by Architect from manufacturer's full range of colors.

## 2.6 ROLLER-SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F.
  - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch plus or minus 1/8 inch.
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible except as follows:
  - 1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4 provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 ROLLER-SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
  - 1. Hardware shall be mounted to jamb or head of window opening. Mounting to the frame is NOT approved.

### 3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

### 3.4 CLEANING AND PROTECTION

- A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122413



## SECTION 123216 – EDUCATIONAL CASEWORK

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings, Division 0 - Bidding and Contract Requirements and Division 1 General Requirements apply to this Section.

#### 1.2 SCOPE OF WORK

- A. Provide all plastic laminate casework and related accessory items as specified herein. Refer to contract documents for specific details and requirements. Casework includes all storage components, accessory items, closure, fillers, and framing necessary for a complete installation, as identified by manufacturers product/model number, or reference thereto.
- B. Specialty product systems as indicated by product designation within contract documents shall include, but not limited to: Steel framed island assemblies, steel framed technology clusters, adjustable and re-locatable casework and computer modules.
- C. General Conditions: The General Conditions, Supplementary General Conditions, Special Conditions, and General Requirements apply to all work in this Division.
- D. Provide coordination with Mechanical and Electrical contractors for their respective installation of mechanical and electrical fixtures.

#### 1.3 RELATED REQUIREMENTS

- A. Division 6 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing paneling and that are concealed within other construction before paneling installation.
- B. Division 6 Section "Interior Architectural Millwork" for general millwork and custom cabinetry unless specified herein or so noted on plans as included within this section.
- C. Division 9 Section "Resilient Base and Accessories" for resilient base applied to laboratory casework.
- D. Division 12 Section "Simulated Stone Fabrication" for solid surface countertops/backsplashes and transaction ledges.
- E. Division 22, 23, 26 for sinks, faucets, fittings, traps, stops, tail pieces, vacuum breakers, and other fixtures, electrical and mechanical runs and connections.
- F. Fixture installation/services connections: Setting and installation of equipment and fixtures, and related utility connections, are provided under the other sections of the Project Specification governing the utility.

1.4 SUBMITTALS

- A. Submit in accordance with General, Supplementary, and Special Conditions.
- B. Submit shop drawings for approval in the form of one reproducible sepia and one print. Show materials, dimensions, cabinet-cut details, and sink locations.
- C. Samples: Contractor shall provide manufacturer’s color PDFs of images of plastic laminate manufacturers for review & approval. Actual samples are NOT required unless specifically requested by the architect/interior designer. Architect to have color choice from full range of laminates, including premium series.

1.5 QUALIFICATIONS

- A. Case System is used to establish a standard of quality subject to compliance with requirements, of the Instructions to Bidders. Products that may be incorporated in the work include:
  - 1. Case Systems.
  - 2. Mastercraft.
  - 3. TMI Systems Corporation.
  - 4. Stevens Advantage Cabinet Systems.
- B. Manufacturers shall submit evidence of at least 5 years experience and installations for similar type of project.
- C. Manufacturers shall submit certified product test data in accordance with ANSI A161.1-1980, NEMA LD3-1991, and general static load testing performed and certified by an independent testing agency, covering the following areas of product performance, with these minimum results.

1. Base cabinet construction/racking test:	800 lbs.
2. Cabinet front joint loading test:	425 lbs.
3. Wall cabinet static load test:	2,200 lbs.
4. Drawer front joint loading test:	600 lbs.
5. Drawer construction/static load test:	635 lbs.
6. Cabinet adjustable shelf support device/static load test:	300 lbs.
7. Particleboard screw holding power:	350 lbs.
- D. The following performance details are project requirements and must be met by all Bidders whether named herein, or approved by Addendum. Deviations will not be allowed.
  - 1. Design:
    - a. All Casework: Case Systems used to establish a standard of quality. Standard Reveal Overlay Cabinet door design with door/drawer front edge having 3mm PVC and cabinet body edge having Flat Edge PVC.
  - 2. ADA-Americans with Disabilities Act Requirements: The special requirements specified herein shall be met, where specifically indicated on architectural plans as "ADA", or by General Note. To be in compliance with Federal Register Volume 56, No. 144, Rules and

Regulations.

3. Lamination System: Doors, finished end panels, and other decorative exterior laminate surfaces shall be composed of minimum 3/4 inch core, laminated exterior with .030 inch high pressure plastic laminate, and interior with .020 inch high pressure cabinet liner. Lamination with hybrid P.V.A. Type III water resistant adhesives. Total thickness 13/16 inch. No exceptions.
  4. Structural Cabinet Body: Cabinet backs shall be minimum 3/8 inch thick, inset from rear of body, fully housed four sides, and back-shimmed. Provide 3/4 inch thick stiffeners glued and fastened to back/body as specified herein. Back perimeter and stiffeners to be fully sealed with hot melt adhesive.
  5. Interior Space: All cabinets shall have clear span interiors. No vertical dividers allowed unless by specified architectural design.
  6. Heavy Components: Wall cabinet tops and bottoms, and all bookstack shelves shall be minimum 1 inch thick, for additional load support. Shelves in door cabinets 30 inches wide and over shall be 1 inch thick. Shelves in open cabinets, regardless of width, shall be 1 inch thick.
  7. Structural Drawer Body: Drawer body material shall be multi-directional fiberboard with bottom recessed, captured all four sides and sealed with hot melt adhesive. Provide under body stiffener as specified herein. Particleboard bodies and/or surface-applied bottoms are not acceptable.
  8. Drawer Suspension: Drawer slides shall be self-closing design, epoxy power-coated, with positive instop, outstop, and out-keeper. Kynamic (operational) load rating to be minimum 100 lbs. Minimum 150 lb. static load rating.
  9. Structural Cabinet Support: Cabinet sub base shall be of a separate and continuous ladder-type platform design leveled and floor mounted prior to cabinet body replacement. Material to be exterior grade plywood. No cabinet sides-to-floor will be allowed.
- E. Architect/Owner's opinion and decision shall be final in the evaluation of manufacturer's products for approval to bid or award of contract.
- F. Guarantee: All materials produced by the Casework Manufacturer shall be guaranteed for a period of five years from manufacturer's defects and workmanship. Other materials and equipment shall carry the Guarantee of the product manufacturer.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### A. Laminated Plastics/Finishes:

1. High pressure plastic laminate, .030 inch thickness, for exterior cabinet surfaces shall meet NEMA LD3-1991 GP28 standards including thickness.
2. Exterior Colors: Refer to drawings.
  - a. Total of 6 different colors available per project.

- b. Manufacturers: Laminates to be selected from a combination of the following laminate manufactures.
        - 1. Wilsonart.
        - 2. Formica.
        - 3. Pionite.
        - 4. Nevamar.
  - 3. Plastic Laminate Balancing Sheet: White high pressure cabinet liner, .020 inch thickness shall meet NEMA LD3-1991 CL 20 standards. Use for balancing exterior surface laminates.
  - 4. Countertop High Pressure Plastic Laminate:
    - a. High pressure plastic laminate, textured finish .050 inch thickness or .042 inch postforming grade as detailed.
    - b. Heavy gauge neutral colored backing sheet for balanced construction.
    - c. Color: Refer to drawings
  - 5. Pressure Fused Laminate/Interior Surfacing:
    - a. Melamine resin impregnated, 100 gram PSM minimum, surface laminated to core under pressure.
    - b. Shall meet NEMA LD3.1-1991 GP28 standards and NEMA LD3-1991 CL20 standards.
    - c. White pressure fused laminate for cabinet interiors behind door and drawers and underside of wall cabinet unless otherwise specified. Interiors of all open cabinets are to be HPL.
    - d. Shall be balanced at all concealed surfaces with phenolic backer. Unsurfaced coreboard not allowed.
- B. High Performance Particle Board Core:
- 1. Particleboard to be 47 lb. density, of balanced 3-ply construction with moisture content not to exceed 8%. Particleboard shall conform to ANSI A208-1-1993, Type M-3.
  - 2. Particleboard cabinet components to be of the following minimum core thickness prior to lamination:
    - a. 3/8" cabinet backs.
    - b. 1/2": dividers, as detailed.
    - c. 3/4": base and tall cabinet tops and bottoms, cabinet sides, drawer spreaders, door, drawer head, cabinet back rear hang strips, dividers as detailed, exposed cabinet backs.
    - d. 1": wall cabinet tops and bottoms, door-cabinet shelving 30 inch width and over, exposed cabinet shelving and off-wall shelving of all widths.
- C. Edging Types: Provide one or more of the following in accordance with Paragraph 2.1.D, "Edging Locations":
- 1. 3mm thick PVC: Solid, high-impact, purified, color-thru, acid resistant, pre-lamination



primed edging, machine-applied with hot melt adhesives, automatically trimmed, inside/outside length-radiused for uniform appearance, buffed and corner-radiused for consistent design.

2. Flat Edge PVC, .020 inch. Solid, high impact, purified, color-thru, acid resistant PVC edging machine-applied with hot melt adhesives, automatically trimmed face, back, and corners for uniform appearance.
3. Colors: Refer to drawings.

D. Edging Locations:

1. Edging locations on ALL Casework: provide edging types at the following locations:
  - a. Door/Drawer-Front edging shall be 3mm PVC.
  - b. Cabinet Body edge, including door/drawer front spacer rail shall be flat edge PVC, color matched to door/drawer face.
  - c. Interior body component edging, interior dividers, drawer body, shelf shall be FlatEdge PVC to match cabinet interior surface color, white.

E. Hardware:

1. Hinges:
  - a. Heavy duty, five knuckle 2 3/4 inch institutional type hinge shall meet ANSI/BHMA A156.9 Grade 1 requirements. Mill ground, hospital tip, tight pin feature with all edges eased. Hinge to be full wrap around type of tempered steel .095 inch thick. Each hinge to have minimum 9 screws, #7, 5/8 inch FHMS to assure positive door attachment.
  - b. One pair per door to 48 inch height. One and one-half pair over 48 inch in height. Hinge to accommodate 13/16 inch thick laminated door and allow 270 degree swing.
  - c. Finish to be LH-301 ChromeCoat Powder Finish.
2. Pulls: Wire design, LH-325 nylon, 4 inch; in Brushed Chrome.
3. Drawer Slides:
  - ac. Standard Drawers: LH-376, self-closing design. White epoxy powder coated with positive in-stop, out-stop, and out-keeper to maintain drawer in 80% open position. Captive nylon rollers, front and rear. Minimum 100 lb. dynamic load rating at 50,000 cycles. Minimum 150 lb. static load rating.
  - b. Paper Storage Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb., zinc plated or epoxy coated at manufacturer's option
  - c. Student Island Assembly Drawers, Full extension, 3-part progressive opening slide, minimum 100 lb. Zinc plated or epoxy coated at manufacturer's option
  - d. File Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb. zinc plated or epoxy coated at manufacturer's option.
  - e. Provide body mounted molded rails for hanging file system for legal or letter size as indicated by manufacturer's model number
4. Catches: Catch to provide opening resistance in compliance with the Americans with Disabilities Act.
  - a. Provide one top-mounted magnetic catch for base, wall and tall cabinet door.

- Catch housing to be molded in White. LH-340ADA.
- b. LH-345 Roller catch for mobile cabinets.
5. Adjustable Shelf Supports: To be LH-354 twin pin design with anti tip-up shelf restraints for both 3/4 inch and 1 inch shelves. Design to include keel to retard shelf slide-off, and slot for ability to mechanically attach shelf to clip. Load rating to be minimum 300 lbs. each support without failure, reference 1.4.D. Cabinet interior sides shall be flush, without shelf system permanent projection.
  6. Wardrobe Rod: To be 1 1/16 inch rod, LH-362, supported by LH-363 flanges.
    - a. *Note: Wardrobe Rods shall be adjustable with mounting at 48 inches and 72 inches A.F.F. to the center of the rod.*
  7. Locks: To be disc tumbler lock keyed alike per room and master keyed. Dull chrome finish.
    - a. Hinged doors and drawers National Lock No. M4-7054.
  8. Coat Hooks: Note Coat Hooks are to be mounted to the casework at 48 inches A.F.F. to the center of the hook.
    - a. Double Coat Hooks, ceiling mount - Satin Aluminum
    - b. Single Coat Hooks, ceiling mount - Satin Aluminum
    - c. Double Coat hooks, wall mount - Satin Aluminum
    - d. Single Coat Hooks, wall mount - Satin Aluminum
  9. Wheel Casters:
    - a. Casters for low mobile units to be LH-390 4 inch x 1 1/16". Minimum 275 lb. Load rating per caster. Wheel brakes on front two casters.
    - b. LH-386 swivel casters for standard mobile cabinets shall be plate type caster with ball bearing swivel. Size shall be 5 inches for tall mobiles, with 1 1/16 inch wide tread for carpet or hard cover floor. Wheel brakes on front two casters. Minimum 300 lb. load rating per caster.
  10. Mobile Steel Frame Structure:
    - a. Low mobile cabinets shall be designed with a structurally layered base to which above specified plate-type casters are bolted.
  11. Molded Personal Pencil Drawer: High-Impact, Medical Grade Polystyrene, FDA approved, with in-stop, out-stop, and self closing features. Compartmented drawer body molded in Black with Black epoxy coated metal slides. Provide where indicated by product designation on plans or as scheduled.
  12. Cable Trays: Unless otherwise specified, cable trays shall be 6 inches high x 4 inches deep returned vertically 3 inches. Cable trays shall be of 16 gauge steel with hemmed return, or high impact Styrene with reinforced exist-ends, Black. When so designated by architectural detail, or product number designation, cable trays shall include integral seven plug grounded duplex electrical strip with surge protector, and 6 foot three wire cord/socket.

13. Padlock Hasp: Zinc, two-piece, non-hinged hasp.
14. Grommets: For cable passage through countertops; 1-1/4-inch outside diameter molded-plastic grommets and matching plastic caps with slot for wire passage. Provide standard color selections: Black, Almond, Grey or White.

## 2.2 CONSTRUCTION

### A. Detailed Requirements for Cabinet Construction

1. Sub-Base:
  - a. Cabinet Sub-Base: To be separated and continuous (no cabinet body sides-to-floor), water resistant exterior grade plywood with concealed fastening to cabinet bottom. Ladder-type construction of front, back and intermediates to form a secure and level platform to which cabinets attached.
  - b. Tubular steel 1 1/4" square base in brushed chrome, or black, furnished where specified.
2. Cabinet Top and Bottom:
  - a. Solid sub-top to be furnished for all base and tall cabinets.
  - b. Wall cabinet and library stack bottoms and tops to be 1 inch thick.
  - c. Exterior exposed wall cabinet bottoms to be Pressure Fused White laminate both sides. Assembly devices to be concealed on bottom side of wall cabinets.
3. Cabinet Ends:
  - a. Holes drilled for adjustable shelves 1 1/4 inch on center.
  - b. Exposed exterior cabinet ends to be laminated with high pressure plastic laminate, balanced with high pressure cabinet liner interior surface.
  - c. Front edges shall be flush with door/drawer face.
4. Fixed and Adjustable Shelves:
  - a. Thickness: Behind doors, to be 3/4 inch to 27 inches wide. One inch shelving at 30 inch wide cabinet and over.
  - b. Thickness at all widths of open cabinets to be 1 inch.
  - c. All tall cabinets shall be provided with an intermediate fixed shelf to maintain internal dimensional stability under heavy loading conditions as well as an intermediate 3/4" thick stretcher located behind the back panel and be secured between the cabinet ends with mechanical fasteners. The stretcher shall be secured to the shelf through the back with #8 x 2" plated flat head screws.
5. Cabinet Backs:
  - a. Cabinet back to be fully housed into sides, top, and bottom, recessed 7/8 inch from cabinet rear. Rear, unexposed, side of back to receive continuous bead of hot melt adhesive at joint between back and sides/top/bottom.
  - b. Hang rails shall be glued to rear of cabinet back and mechanically fastened to cabinet sides. Provide minimum of 2 at base, 2 at wall, and 3 at tall cabinets.
  - c. Exposed exterior backs to be high pressure plastic laminate balanced with high pressure cabinet liner.

6. Door and Drawer Fronts:
  - a. Laminated door and drawer fronts to be 13/16 inch thick for all hinged and sliding doors. Drawer fronts and hinged doors are to overlay the cabinet body. Maintain a maximum 1/8 inch reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
  - b. Stile and Rail doors shall be 13/16 inch thick glazed with full ¼ inch glass. Available hinged or sliding. All exposed lite-opening edges shall be trimmed and glazed with extruded vinyl glazing bead.
7. Drawers:
  - a. Drawer fronts shall be applied to separate drawer body component sub-front.
  - b. Drawer sides shall be dadoed and glued to receive front and back, machine squared and held under pressure while hot melt glued and pinned together.
  - c. Drawer bottom to be housed into front, sides and back. Underside of drawer to receive continuous bead of hot melt adhesive at joint between bottom and back/sides/front for sealing and rigidity. Reinforce drawer bottoms with 1/2 inch by 4 inch front-to-back intermediate underbelly stiffeners, hot melt glued and fastened. One at 24 inch, two at 36 inch, four at 48 inch.
  - d. Paper storage drawers fitted with full width hood at back.
  - e. All drawers shall have roller guides as specified under Paragraph 2.1.E.3.
8. Vertical and Horizontal Dividers: One of the following as indicated by cabinet number:
  - a. Natural hardboard 1/4 inch thick, smooth both faces. Secured in cabinet with molded plastic clips.
  - b. Pressure Fused laminate 3/4 inch thickness. Secured in cabinet with molded plastic clips or dowels.
9. Door/Drawer Front Rail: Provide minimum 3/4 inch x 6 inch x full width cabinet body rails immediately behind all door/drawer and multiple drawer horizontal joints to maintain exact body dimensions, close off reveal, and be locator for lock strikes.
10. ADA-Americans with Disabilities Act Requirements: The following special requirements shall be met, where specifically indicated on architectural plans as "ADA", or by General Note. To be in compliance with Federal Register Volume 56, No. 144, Rules and Regulations:
  - a. Countertop height: with or without cabinet below, not to exceed a height of 34 inches A.F.F., (Above Finished Floor), at a surface depth of 24 inches.
  - b. Kneecap clearance: to be minimum 27 inches A.F.F., and 30 inches clear span width.
  - c. 12 inch deep shelving, adjustable or fixed: not to exceed a range from 9 inches A.F.F. to 54 inches A.F.F.
  - d. Wardrobe cabinets: Shall be furnished with rod/shelf adjustable to 48 - 72 inches A.F.F. at a maximum 21 inch shelf depth.
  - e. Sink cabinet clearances: in addition to 10.a,b. above, upper kneecap frontal depth to be no less than 8 inches, and lower toe frontal depth to be no less than 11 inches, at a point 9 inches A.F.F., and as further described in Volume 56, Section 4.1.9.

B. Countertops:

1. General: High pressure plastic laminate bonded to particleboard core. Thickness as shown on plans. Underside to be properly balanced with heavy gauge backing sheet. Provide tops in as long as practical continuous lengths. Provide field glued splines at joints. No joints closer than 24 inches either side of sink cutout.
  - a. Edge Treatment: Self-Edge.

C. Workmanship

1. All exposed exterior cabinet surfaces to be .030 inch high pressure laminate. Laminate surface/balancing liner to core under controlled conditions, by approved and regulated laminating methods to assure a premium lamination. Natural-setting hybrid P.V.A. Type III water resistant adhesives that cure through chemical reaction, containing no health or environmentally hazardous ingredients, are required. Methods requiring heat are not allowed; "contract" methods of laminating are not allowed.
2. Cabinet parts shall be accurately machined and bored for premium grade quality joinery construction utilizing automatic machinery to insure consistent sizing of modular components. End panels shall be doweled to receive bottom and top.
3. Back panel shall be fully housed into, and recessed 7/8 inch from the back of cabinet sides, top, and bottom to insure rigidity and fully closed cabinet. Cabinet back shall be shimmed from rear of body for tight interior fit.
4. Drawer bottom shall be fully housed into and recessed 1/2 inch up from the bottom of sides, back and subfront. Sides of drawer shall be fully dadoed to receive drawer back, locked in fully to subfront, fastened with glue and mechanical fasteners.
5. 3/4 inch thick hang rails shall be glued to backside and mechanically fastened to end panels of all wall, base, and tall cabinets for extra rigidity and to facilitate installation.
6. Rear of cabinet back and underside of drawer bottom joints to receive a continuous bead of hot melt adhesive to add to unit body strength and develop moisture and vermin seal.
7. All cases shall be square, plumb, and true.
8. Case body and drawer workmanship and quality of construction shall be further evidenced by Independent Testing Laboratory results as described in 1.4.D.
9. Provide removable back panels and closure panels for plumbing access where shown on drawings.

D. Mobile Cabinet Design and Construction:

1. No conventional particleboard-to-particleboard fastening allowed as structural members. Low mobile cabinets shall be designed with a structurally layered base, to which plate-type casters are bolted.
2. No exposed fasteners.
3. Design profile shall be flush inset door and flush inset finished back, between end panels.
4. Unit top shall be 3 mm PVC with radiused corners, and overhand case front, back, and sides to function as a bumper system.

H. Fabric Wrapped Frameless Tack Boards.

1. Fabric shall Carnegie Xorel – Meteor. 16-oz-per-linear-yard, 100% IRP Xorel. Provide fabric with a flame-spread rating of 25 or less when tested according to ASTM E 84. Provide color and texture as selected by Architect from manufacturer’s full range of (80) colors.
  - a. Refer to drawings for model numbers and locations.

### PART 3 – EXECUTION

#### 3.1 COORDINATION

- A. Coordinate work of this Section with related work of other Sections as necessary to obtain proper installation of all items.
- B. Verify site dimensions of cabinet locations in building prior to fabrication.

#### 3.3 INSTALLATION

- A. Storage and Protection: Casework shall be protected in transit. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes. Do not store or install casework in building until concrete, masonry, and drywall/plaster work is dry.
- B. Workmen: Install casework under the supervision of the manufacturer's representative with factory-trained mechanics certified by manufacturer.
- C. Workmanship
  1. Erect casework straight, level and plumb and securely anchor in place. Scribe and closely fit to adjacent work. Cut and fit work around pipes, ducts, etc.
  2. Install all items complete and adjust all moving parts to operate properly.
  3. Leave surface clean and free from defects at time of final acceptance.
- D. Guarantee: All materials shall be guaranteed for a period of 5 years from manufacturer's defects and workmanship.
- E. Clean Up: Remove all cartons, debris, sawdust, scraps, etc., and leave spaces clean and all casework ready for Owner's use.

END OF SECTION 123216

## SECTION 123661 - SIMULATED STONE FABRICATIONS

### 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-surface-material countertops.
- B. Related Requirements:
  - 1. Division 6 Section "Interior Architectural Woodwork" for custom cabinets.
  - 2. Division 7 Section "Joint Sealants" for sealants installed with solid surface materials.

#### 1.3 SUBMITTALS

- A. Shop drawings: Indicate dimensions, component sizes, fabrication details, attachment, provisions and coordination requirements with adjacent work.
- B. Product data: Indicate product description, fabrication information and compliance with specified performance requirements.
- C. Maintenance data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project close-out documents.
- D. Samples: Contractor shall provide manufacturer's color pdf images of solid-surface-material for review & approval. Actual samples are NOT required unless specifically requested by the architect/interior designer.

#### 1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

#### 1.5 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

## PART 2 - PRODUCTS

### 2.1 SOLID-SURFACE-MATERIAL FABRICATION

- A. Configuration: Provide countertops with the following front style:
  - 1. Front: Straight, slightly eased at top and bottom.
- B. Countertops: 1/2-inch- with front edge built up with same material.
  - 1. Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
    - a. Fabricate with loose backsplashes for field assembly.
    - b. Install integral sink bowls in countertops in the shop.
    - c. Make cutouts to templates furnished by the manufacturer.
    - d. Reinforce edges and cutouts as recommended by the manufacturer.
  - 2. Joints: Fabricate countertops in sections for joining in field, with joints at locations indicated.
    - a. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.

### 2.2 MATERIALS

- A. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
- B. Adhesives: Do not use adhesives that contain urea formaldehyde.
- C. Adhesives: Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
  - 1. Manufacturers: Subject to compliance with requirements, provide the following
    - a. Dupont, Corian Solid Surface.
  - 2. Colors: As selected from Group 4.



## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install solid-surface-materials level to a tolerance of 1/8 inch in 8 feet.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface. Refer to drawings for additional details.
  - 1. Seal edges of cutouts in plywood subtops by saturating with varnish.
- C. Apply sealant to gaps at walls; comply with Division 7 Section "Joint Sealants."
- D. Install all solid-surface-materials to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

END OF SECTION 123661



## SECTION 124813 - ENTRANCE FLOOR MATS

### 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 of this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Rubber-Tire Mats.
- B. Related Requirements:
  - 1. Division 3 Section "Hydraulic Cement Underlayment" for Self-Leveling Underlayment.
  - 2. Division 3 Section "Cast-in-Place Concrete" for Moisture Vapor Reduction Admixture.
  - 3. Division 9 Section "Resilient Base and Accessories" for resilient wall and accessories installed with resilient tile.

#### 1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type of floor mat specified, including manufacturer's specifications and installation instructions, details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- C. Shop drawings showing layout and types of floor mat, full-scale sections of typical installations, details of patterns or designs, and accessories.
- D. Samples for initial selection purposes in form of manufacturer's color charts consisting of actual sections of floor mat materials, showing full range of colors, textures, finishes, and patterns available.
- E. Samples for verification purposes in form of 12-inch-square assembled section of floor mat with selected tread surface showing color of exposed floor mat. Where finishes involve normal color and texture variations, include sample sets showing full range of variations expected.
- F. Maintenance data in form of manufacturer's printed instructions for cleaning and maintaining floor mats.

#### 1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain floor mats and frames from one source from a single manufacturer.

#### 1.5 SEQUENCING AND SCHEDULING

- A. Defer mat installations until building enclosure is completed and related interior finish work is in progress. Recess in-fill concrete where required for placement of concrete topping.

### PART 2 - PRODUCTS

#### 2.1 ENTRANCE MAT (EM)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Basis of Design:
    - a. R.C. Musson Rubber Co.,
      - i. Series: TT-12CT
  - 2. Approved Manufacturers:
    - a. American Floor Products Co.
    - b. Pawling Corp., Standard Products Div.
    - c. U.S. Mat and Rubber Co., Inc.

#### 2.2 MATERIALS

- A. General: Provide colors, patterns, and profiles of materials as selected by Architect from manufacturer's standard colors, patterns, and profiles.
  - 1. Color: As selected from manufacturers full range of color selections. Provide a minimum of (4) colors.
- B. Rubber-Tire Mats: Provide manufacturer's standard units of edge-grain-laminated and chenille-buffed rubber-tire wall cuts, bonded to sheet rubber or other durable flexible backing sheet in 12 inches by 12 inches by 3/8-inches thick for surface mount installation.
- C. Adhesives: Provide manufacturer's adhesive, Musson NO. TT-390 Non-Flammable Environmentally Safe Outdoor Adhesive.
  - 1. Provide adhesive for the following substrates:

- a. Substrates without moisture vapor reduction admixture: Porous Adhesive.
- b. Substrates with moisture vapor reduction admixture: Non-Porous Adhesive.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install surface-type units to comply with manufacturer's instructions, at locations indicated and coordinated with entrance locations and traffic patterns.

### 3.2 PROTECTION

- A. Upon completion of concrete work, provide temporary filler of plywood or fiberboard in recesses. Maintain protection until construction traffic has ended and project is near time of Substantial Completion.
- B. Defer installation of floor mats until near time of Substantial Completion for project.

END OF SECTION 124813





