Project Manual

for

# **Spanish Fork City**

## **Facilities Shop**

433 South Main Street Spanish Fork, Utah 84660

MAY 22, 2023





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31 20 00 EARTH MOVING

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### DOCUMENT 00 01 15

### LIST OF DRAWING SHEETS

### 1.1 LIST OF DRAWINGS

- A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Table of Contents page of the separately bound drawing set titled "Facilities Shop", dated 03.02.2023, as modified by subsequent Addenda and Contract modifications.
- B. List of Drawings: Drawings consist of the following Contract Drawings and other drawings of type indicated:

### 1. General Sheets

- a. G1.1 Cover Sheet
- b. G1.2 Code Analysis
- c. G1.3 Accessibility Requirements
- 2. Civil Sheets
  - a. C-001 Civil Title Sheet
  - b. C-002 Legends and Notes
  - c. V-101 Survey Control
  - d. C-101 Site Plan
  - e. C-201 Grading and Drainage
  - f. C-202 Pedestrian Path Grading
  - g. C-301 Utility Plan
  - h. C-501 Details
  - i. C-502 Details
  - j. C-503 Details
  - k. C-504 Details
  - I. SFCN Site Electrical Drawings

### 3. Architectural

- a. A2.1 Main Level Floor Plan
- b. A2.2 Mezzanine Floor Plan
- c. A3.1 Construction Types
- d. A3.2 Room Finish Schedule, Large Scale Floor Plans and Interior Elevations
- e. A3.3 Door and Window Schedules & Details
- f. A4.1 Exterior Elevations
- g. A5.1 Building Sections
- h. A5.2 Building Sections
- i. A7.1 Roof Plan
- j. A8.1 Main Floor Reflected Ceiling Plan
- k. A9.1 Large Scale Stair Plans and Sections
- 4. Structural
  - a. S-001 General Notes
  - b. S-002 Schedules Concrete
  - c. S-003 Schedules Wood
  - d. S-101 Footing and Foundation Plan
  - e. S-201 Mezzanine Framing Plan
  - f. S-501 Foundation Details
  - g. S-511 Framing Details
- 5. Mechanical
  - a. M0.1 Mechanical Notes and Legends
  - b. M1.1 Mechanical Floor Plan
  - c. M1.2 Mechanical Mezzanine Plan
  - d. M5.1 Mechanical Details
  - e. M5.2 Mechanical Details
  - f. M6.1 Mechanical Schedules
- 6. Plumbing
  - a. P0.1 Plumbing Notes and Legends
  - b. P1.1 Plumbing Floor Plan
  - c. P1.2 Plumbing Mezzanine Plan
  - d. P5.1 Plumbing Details

- e. f.
- P5.2 Plumbing Details P6.1 Plumbing Schedules and Schematics
- 7. Electrical
  - E0.1 Electrical Notes and Legends E1.1 Electrical Floor Plan a.
  - b.
  - E1.2 Electrical Mezzanine Plan C.
  - E4.1 Enlarged Floor Plans E5.1 Electrical Details d.
  - e.
  - E5.2 Electrical Details f.
  - E5.3 Electrical Details g.
  - ĥ. E6.1 Electrical Schedules
  - i. **E7.1 Electrical Specifications**

END OF DOCUMENT 00 01 15

### DOCUMENT 00 31 32

### GEOTECHNICAL DATA

### 1.1 GEOTECHNICAL DATA

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.
- B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.
- C. Soil-boring data for Project, obtained by CMT Engineering Laboratories, dated April 27, 2022, is available for viewing at the office of Architect or at the office of Owner.
- D. A geotechnical investigation report for Project, prepared by CMT Engineering Laboratories, dated April 27, 2022, is available for viewing at the office of Architect or at the office of Owner.
  - 1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
  - 2. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.

END OF DOCUMENT 00 31 32

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### SECTION 01 78 39

### PROJECT RECORD DOCUMENTS - BUILDING ARCHITECTURE

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.

### 1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set(s) of marked-up record prints or a PDF electronic file of scanned or marked up prints.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.

### 1.3 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies or a PDF electronic file of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding photographic documentation.
  - 2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Construction Change Directive.
    - k. Changes made following Architect's written orders.
    - I. Details not on the original Contract Drawings.
    - m. Field records for variable and concealed conditions.
    - n. Record information on the Work that is shown only schematically.
  - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  - 4. Mark record prints with erasable, red-colored pencil or electronic PDF notation. Use other colors to distinguish between changes for different categories of the Work at same location.
  - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  - 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

### 1.4 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
  - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  - 4. Note related Change Orders and Record Drawings where applicable.
- B. Format: Submit record specifications as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Specifications.

### 1.5 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 39

### SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

- 1.1 SUMMARY
  - A. Section Includes:
    - 1. Form-facing material for cast-in-place concrete.
    - 2. Shoring, bracing, and anchoring.
- 1.2 ACTION SUBMITTALS
  - A. Product Data: For each of the following:
     1. Exposed surface form-facing material.
- PART 2 PRODUCTS
- 2.1 FORM-FACING MATERIALS
  - A. As-Cast Surface Form-Facing Material:
    - 1. Provide continuous, true, and smooth concrete surfaces.
    - 2. Furnish in largest practicable sizes to minimize number of joints.
    - 3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 03 30 00 "Cast-In-Place Concrete, and as follows:
      - a. Plywood, metal, or other approved panel materials.
      - b. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1.
        - 1) APA HDO (high-density overlay).
        - 2) APA MDO (medium-density overlay); mill-release agent treated and edge sealed.
        - 3) APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
        - 4) APA Plyform Class I, B-B or better; mill oiled and edge sealed.
  - B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.
     1. Provide lumber dressed on at least two edges and one side for tight fit.

### 2.2 RELATED MATERIALS

- A. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- B. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
  - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
  - 2. Form release agent for form liners shall be acceptable to form liner manufacturer.
- F. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
- 2.3 INSTALLATION OF FORMWORK
  - A. Comply with ACI 301 (ACI 301M).
  - B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M) and to comply with the Surface Finish designations specified in Section 03 30 00 "Cast-In-Place Concrete" for as-cast finishes and Section 03 33 00 "Architectural Concrete".

- C. Limit concrete surface irregularities as follows:
  - 1. Surface Finish-1.0: ACI 117 Class D, 1 inch (25 mm).
  - 2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch (6 mm).
  - 3. Surface Finish-3.0: ACI 117 Class A, 1/8 inch (3.0 mm).
- D. Construct forms tight enough to prevent loss of concrete mortar.
  - 1. Minimize joints.
  - 2. Exposed Concrete: Symmetrically align joints in forms.
- E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
  - 1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
  - 2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 3. Install keyways, reglets, recesses, and other accessories, for easy removal.
- F. Do not use rust-stained, steel, form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.
  - 1. Provide and secure units to support screed strips.
  - 2. Use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
  - 1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
  - 2. Locate temporary openings in forms at inconspicuous locations.
- I. Do not chamfer exterior corners and edges of permanently exposed concrete.
- J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches (305 mm).
- K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
  - 1. Determine sizes and locations from trades providing such items.
  - 2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.
- L. Construction and Movement Joints:
  - 1. Construct joints true to line with faces perpendicular to surface plane of concrete.
  - 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 3. Place joints perpendicular to main reinforcement.
  - 4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
    - a. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  - 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  - 6. Space vertical joints in walls at 10'-0" maximum spacing.
    - a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
  - 1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
  - 2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.
- N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 2.4 INSTALLATION OF 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.
  - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
  - 3. Install reglets to receive 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.
  - 4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
  - 5. Clean embedded items immediately prior to concrete placement.

END OF SECTION 03 10 00

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### 1.1 SUMMARY

A. Section Includes:1. Steel reinforcement bars.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Each type of steel reinforcement.
  - 2. Bar supports.
- B. Shop Drawings: Comply with ACI SP-066:
  - 1. Include placing drawings that detail fabrication, bending, and placement.
  - 2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
- C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.
  - 1. Location of construction joints is subject to approval of the Architect.

### PART 2 - PRODUCTS

1.

- 2.1 STEEL REINFORCEMENT
  - A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.
  - B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
    - Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
      - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
  - C. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch (1.2908 mm) in diameter.
- 2.2 FABRICATING REINFORCEMENT
  - A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

### PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protection of In-Place Conditions:
  - 1. Do not cut or puncture vapor retarder.
  - 2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- 3.2 INSTALLATION OF STEEL REINFORCEMENT
  - A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
  - B. Accurately position, support, and secure reinforcement against displacement.
    - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
    - 2. Do not tack weld crossing reinforcing bars.
  - C. Preserve clearance between bars of not less than 1 inch (25 mm), not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

- D. Provide concrete coverage in accordance with ACI 318 (ACI 318M).
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
  - 1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches (610 mm), whichever is greater.
  - 2. Stagger splices in accordance with ACI 318 (ACI 318M).
  - 3. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches (50 mm) for plain wire and 8 inches (200 mm) for deformed wire.
  - 4. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
  - 5. Lace overlaps with wire.

### 3.3 JOINTS

- A. 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.
  - 2. Continue reinforcement across construction joints unless otherwise indicated.
  - 3. Do not continue reinforcement through sides of strip placements of floors and slabs.
- 3.4 INSTALLATION TOLERANCES
  - A. Comply with ACI 117 (ACI 117M).
- 3.5 FIELD QUALITY CONTROL
  - A. Special Inspections: As outlined in Statement of Special Inspections.

END OF SECTION 03 20 00

### SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
   1. Section 31 20 00 "Earth Moving" for drainage fill under slabs-on-grade.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.
- C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.
- D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

### 1.5 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

### 1.6 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1.
   1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M).

### PART 2 - PRODUCTS

- 2.1 CONCRETE, GENERAL
  - ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
     1. ACI 301 (ACI 301M).
    - 2. ACI 117 (ACI 117M).

### 2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- 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.

### 2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

### 2.4 CONCRETE MATERIALS

- A. Cementitious Materials:
  - 1. Portland Cement: ASTM C 150/C 150M, Type II.
  - 2. Fly Ash: ASTM C 618.
- B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.
  - 1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Air-Entraining Admixture: ASTM C 260/C 260M.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- E. Water: ASTM C 94 and potable.

### 2.5 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape. Subject to compliance with requriements, available manufacturers offering products that may be incorporated in to the Work include, but are not limited to the following:
  - 1. Stego Industries, LLC
  - 2. W.R. Meadows, Inc.
- 2.6 CURING MATERIALS
  - A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
  - B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
  - C. Water: Potable.

### 2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

### 2.8 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).
- B. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing or plasticizing admixture 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.
  - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

### 2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Normal-Weight Concrete:
  - 1. Minimum Compressive Strength: As indicated at 28 days.
  - 2. Maximum W/C Ratio: 0.50 for 3000 psi; 0.45 for 4000 psi.
  - 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
  - 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
  - 5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
- 2.10 FABRICATING REINFORCEMENT
  - A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

### 2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
  - When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

### PART 3 - EXECUTION

### 3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until 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 (ACI 117M).

### 3.2 EMBEDDED ITEM INSTALLATION

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.

### 3.3 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

### 3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

### 3.5 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.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
  - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  - Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- 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.

### 3.6 WATERSTOP INSTALLATION

A. Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions.

### 3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is 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 indicated. Deposit concrete to avoid segregation.
  - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).

### 3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces not exposed to public view.
- 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 defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
  - 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.
  - Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 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 matches 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.

- 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- 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 FINISHING FLOORS AND SLABS

- Α. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or Β. darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.
  - 1. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.
- Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or C. 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 to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or powerdriven 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 exposed to view or to be covered with resilient flooring, carpet, ceramic or guarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
  - 2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch (4.8 mm).
- Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be Ε. installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.
  - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
  - Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle 1. broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

#### 3.10 CONCRETE PROTECTING AND CURING

- General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Α. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) for hot-weather protection during curing.
- В. 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 (1 kg/sq. m 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 for remainder of curing period.

- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
  - 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.

### 3.11 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.
- 3.12 FIELD QUALITY CONTROL
  - A. Special Inspections: Owner will engage a special inspector and a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 03 30 00

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Cast-in-place architectural concrete, including form facings, reinforcement accessories, concrete materials, concrete mixtures, concrete placement, and concrete finishes.
  - 2. Requirements in Section 03 30 00 "Cast-in-Place Concrete" apply to this Section.

### 1.2 DEFINITIONS

- A. Aggregate Exposure: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.
- B. Cast-in-Place Architectural Concrete: Concrete that is exposed to view, is designated as architectural concrete, and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.
- C. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- D. designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.
- E. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

### 1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each of the following:
  - 1. Form-facing panels.
  - 2. Form joint tape.
  - 3. Form joint sealant.
  - 4. Wood sealer.
  - 5. Form-release agent.
  - 6. Surface retarder.
  - 7. Form ties.
  - 8. Bar supports.
  - 9. Portland cement.
  - 10. Fly ash.
  - 11. Slag cement.
  - 12. Blended hydraulic cement.
  - 13. Aggregates.
  - 14. Admixtures:
    - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
- B. Samples: For each of the following materials:
  - 1. Form-facing panels.
  - 2. Form ties.
  - 3. Form liners, 12-by-12-inch (305-by-305-mm) Sample, indicating texture.
  - 4. Exposed aggregates.
  - 5. Chamfers and rustications.
- C. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:
  - 1. Concrete Class designation.

- 2. Location within Project.
- 3. Exposure Class designation.
- 4. Formed Surface Finish designation and final finish.
- 5. Curing process.
- D. Placement Schedule: Submit before start of placement operations.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following:
  - 1. Cementitious materials.
  - 2. Admixtures.
  - 3. Form materials and form-release agents.
- B. Material Test Reports: For the following, by a qualified testing agency:
  - 1. Portland cement.
  - 2. Fly ash.
  - 3. Slag cement.
  - 4. Blended hydraulic cement.
- C. Research Reports: For concrete admixtures in accordance with ICC AC198.
- D. Preconstruction Test Reports: For each mix design.

### 1.6 QUALITY ASSURANCE

- A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
  - 1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Installer Qualifications: An experienced cast-in-place architectural concrete installer, as evidenced by not less than five consecutive years' experience, specializing in installing cast-in-place architectural concrete 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.
  - 1. Provide written evidence of qualifications and experience.
  - 2. Include locations, descriptions, and photographs of completed projects, including name of architect, substantiating the quality of the installer's experience.
- C. Field Sample Panels: After approval of verification sample and before casting architectural concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, cast vertically, approximately 48 by 48 by 6 inches (1200 by 1200 by 150 mm) minimum, to demonstrate the expected range of finish, color, and texture variations.
  - 1. Locate panels as indicated or, if not indicated, as directed by Architect.
  - 2. Demonstrate methods of curing, aggregate exposure, wood sealers, and coatings, as applicable.
  - 3. In presence of Architect, damage part of an exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.
  - 4. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
  - 5. Demolish and remove field sample panels when directed.
- D. Mockups: Before casting architectural concrete, build mockups, using the same procedures, equipment, materials, finishing procedures, and curing procedures that will be used for producing architectural concrete, to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, color, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
  - 2. Build mockups of typical wall of cast-in-place architectural concrete as shown on Drawings, including vertical and horizontal rustication joints, and any sculptured features.
  - 3. Construct mockups to include at least two lifts having heights equal to those anticipated for construction.

- 4. Demonstrate curing, cleaning, and protecting of cast-in-place architectural concrete, finishes, and contraction joints, as applicable.
- 5. In presence of Architect, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair to match adjacent undamaged surfaces.
- 6. In presence of Architect, demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.
- 7. Obtain Architect's approval of mockups before casting architectural concrete.
- 8. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### 1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.
  - 1. Include the following information in each test report:
    - a. Admixture dosage rates.
    - b. Slump.
    - c. Air content.
    - d. Seven-day compressive strength.
    - e. 28-day compressive strength.

### PART 2 - PRODUCTS

- 2.1 CONCRETE, GENERAL
  - A. ACI Publications: Comply with ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents.
- 2.2 FORM-FACING MATERIALS
  - A. Comply with Section 03 10 00 "Concrete Forming and Accessories" for formwork and other form-facing material requirements, and as specified in this Section.
  - B. Form-Facing Panels for Exposed Finishes:
    - 1. Steel- and glass-fiber-reinforced plastic, or other approved nonabsorptive panel materials that provide continuous, true, and smooth architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
    - 2. Exterior-grade plywood panels, nonabsorptive, that will provide continuous, true, and smooth architectural concrete surfaces.
  - C. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch (19 by 19 mm), minimum; nonstaining; in longest practicable lengths.
  - D. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800; minimum 1/4 inch (6 mm) thick.
  - E. Form Joint Sealant: Elastomeric sealant complying with ASTM C920, Type M or Type S, Grade NS, that adheres to form joint substrates, does not stain, does not adversely affect concrete surfaces, and does not impair subsequent treatments and finishes of concrete surfaces.
  - F. Wood Sealer: Penetrating, clear, polyurethane wood sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood and does not stain, does not adversely affect concrete surfaces, and does not impair subsequent treatments and finishes of concrete surfaces.
  - G. Form-Release Agent: Commercially formulated, colorless form-release agent that does not bond with, stain, or adversely affect architectural concrete surfaces and will not impair subsequent treatments and finishes of architectural concrete surfaces.
    - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
  - H. Surface Retarder: Water-soluble chemical liquid set retarder, for application on form-facing materials, capable of temporarily delaying final hardening of newly placed architectural concrete surface to depth of aggregate exposure specified.

### 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.
  - 1. Manufacture bar supports in accordance with CRSI's "Manual of Standard Practice."

### 2.4 CURING MATERIALS

A. Comply with Section 03 30 000 "Cast-in-Place Concrete."

### 2.5 CONCRETE MIXING

- A. Architectural Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.
  - 1. Clean equipment used to mix and deliver cast-in-place architectural concrete to prevent contamination from other concrete.
  - 2. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
  - 3. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
  - 4. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

### PART 3 - EXECUTION

### 3.1 INSTALLATION OF FORMWORK

- A. Comply with Section 03 10 00 "Concrete Forming and Accessories" for formwork, embedded items, and shoring and reshoring, and as specified in this Section.
- B. Limit deflection of form-facing panels to not exceed ACI 301 (ACI 301M) requirements.
- C. Limit cast-in-place architectural concrete surface irregularities, as follows:
  - 1. Surface Finish-1.0: ACI 117 (ACI 117M) Class D, 1 inch (25 mm).
  - 2. Surface Finish-2.0: ACI 117 (ACI 117M) Class B, 1/4 inch (6 mm).
  - 3. Surface Finish-3.0: ACI 117 (ACI 117M)Class A, 1/8 inch (3.0 mm).
- D. Construct forms to result in cast-in-place architectural concrete that complies with ACI 117 (ACI 117M).
- E. Chamfer exterior corners and edges of cast-in-place architectural concrete.
- F. Coat contact surfaces of wood rustications and chamfer strips with wood sealer before placing reinforcement, anchoring devices, and embedded items.
- G. Coat contact surfaces of forms with form-release agent, in accordance with manufacturer's written instructions, before placing reinforcement, anchoring devices, and embedded items.
- H. Coat contact surfaces of forms with surface retarder, in accordance with manufacturer's written instructions, before placing reinforcement, anchoring devices, and embedded items.

### 3.2 INSTALLATION OF REINFORCEMENT AND ACCESSORIES

A. Comply with Section 03 20 00 "Concrete Reinforcing" for fabricating and installing steel reinforcement and accessories.

### 3.3 JOINTS

- A. Construction Joints: Install construction joints true to line, with faces perpendicular to surface plane of castin-place architectural concrete, 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.

### 3.4 CONCRETE PLACEMENT

A. Comply with Section 03 30 00 "Cast-in-Place Concrete."

### 3.5 FINISHING FORMED SURFACES

- A. Comply with Section 03 30 00 "Cast-in-Place Concrete."
- B. Architectural Concrete Finish: Match Architect's design reference sample, identified and described as indicated, to satisfaction of Architect.

### 3.6 CONCRETE CURING

A. Comply with Section 03 30 00 "Cast-in-Place Concrete" using identical curing procedures to that used for mockups.

### 3.7 REPAIR

- A. Comply with ACI 301 (ACI 301M).
- B. Repair damaged finished surfaces of cast-in-place architectural concrete when repairing is approved by Architect.
- C. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
- D. Remove and replace cast-in-place architectural concrete that cannot be repaired to Architect's approval.

### 3.8 FIELD QUALITY CONTROL

A. Comply with Section 03 30 00 "Cast-in-Place Concrete."

### 3.9 CLEANING

- A. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.
- B. Wash and rinse surfaces in accordance with concrete finish applicator's written instructions.
  - 1. Protect other Work from staining or damage due to cleaning operations.
  - 2. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

### 3.10 PROTECTION

- A. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.
- B. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.

### 3.11 FINAL ACCEPTANCE

A. Final acceptance of completed architectural concrete Work will be determined by Architect.

END OF SECTION 03 33 00

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### SECTION 05 52 13 - PIPE AND TUBE RAILINGS

### PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes: 1. Steel railings.

### 1.2 ACTION SUBMITTALS

- A. Product Data:
  - 1. Manufacturer's product lines of mechanically connected railings.
  - 2. Handrail brackets.
  - 3. Shop primer.
  - 4. Intermediate coats and topcoats.
  - 5. Bituminous paint.
  - 6. Nonshrink, nonmetallic grout.
  - 7. Anchoring cement.
  - 8. Metal finishes.
  - 9. Paint products.
- B. Sustainable Design Submittals:
  - 1. <u>Product Data</u>: For recycled content, indicating postconsumer and preconsumer recycled content.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- D. Samples: For each type of exposed finish.
- E. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For delegated-design professional engineer.
- B. Welding certificates.
- C. Product Test Reports: For tests on railings performed by a qualified testing agency, in accordance with ASTM E894 and ASTM E935.

### 1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."
  - 2. AWS D1.2/D1.2M, "Structural Welding Code Aluminum."
  - 3. AWS D1.6/D1.6M, "Structural Welding Code Stainless Steel."

### PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
    - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Infill of Guards:

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- a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
- b. Infill load and other loads need not be assumed to act concurrently.

### 2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
  - 1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch (38-mm) clearance from inside face of handrail to finished wall surface.

### 2.3 STEEL RAILINGS

- A. <u>Recycled Content of Steel Products</u>: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Tubing: ASTM A500/A500M (cold formed) or ASTM A513/A513M, Type 5.
- C. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
  1. Provide galvanized finish for exterior installations and where indicated.
- D. Plates, Shapes, and Bars: ASTM A36/A36M.

### 2.4 FASTENERS

- A. Fastener Materials:
  - 1. Ungalvanized-Steel Railing Components: Plated steel fasteners complying with ASTM F1941 (ASTM F1941M), Class Fe/Zn 5 for zinc coating.
  - 2. Hot-Dip Galvanized Railing Components: Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/F2329M for zinc coating.
- B. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.
  - 1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
  - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593, and nuts, ASTM F594.

### 2.5 MISCELLANEOUS MATERIALS

- A. Handrail Brackets: Cast nickel-silver, center of handrail 2-1/2 inches (63.5 mm) from wall.
- B. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.
   1. For stainless steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Shop Primers: Provide primers that comply with Section 09 91 13 "Exterior Painting"."
- F. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- G. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

- H. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- I. Intermediate Coats and Topcoats: Provide products that comply with Section 09 91 13 "Exterior Painting."
- J. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.
- K. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.
- L. Bituminous Paint: Cold-applied asphalt emulsion, complying with ASTM D1187/D1187M.
- M. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout, complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- N. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
  - 1. Water-Resistant Product: At exterior locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

### 2.6 FABRICATION

- A. Cut, drill, and punch metals cleanly and accurately.
  - 1. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated.
  - 2. Remove sharp or rough areas on exposed surfaces.
- B. Form work true to line and level with accurate angles and surfaces.
- C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.
  - 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 welds; good appearance, completely sanded joint, some undercutting and pinholes okay
- D. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
- E. Form changes in direction as follows:
  - 1. By bending.
- F. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- G. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.
- H. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
- I. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
  - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- J. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.

- 1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
- 2. Coordinate anchorage devices with supporting structure.
- K. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with metal plate forming bottom closure.
- 2.7 STEEL AND IRON FINISHES
  - A. Galvanized Railings:
    - 1. Hot-dip galvanize steel railings, including hardware, after fabrication.
    - 2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
    - 3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
  - B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
  - C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner and as follows.
     1. Comply with SSPC-SP 16.
  - D. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, hot-dip galvanize anchors to be embedded in exterior concrete or masonry.
  - E. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below:
    - 1. Exterior Railings: SSPC-SP 6/NACE No. 3.
    - 2. Railings Indicated To Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3.
    - 3. Railings Indicated To Receive Primers Specified in Section 09 96 00 "High-Performance Coatings": SSPC-SP 6/NACE No. 3.
    - 4. Other Railings: SSPC-SP 3.
  - F. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1 for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
    - 1. Shop prime uncoated railings with universal shop primer unless zinc-rich primer is indicated.
    - 2. Do not apply primer to galvanized surfaces.
  - G. Shop-Painted Finish: Comply with Section 09 91 13 "Exterior Painting."
    - 1. Color: As selected by Architect from manufacturer's full range.

### PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Perform cutting, drilling, and fitting required for installing railings.
  - 1. Fit exposed connections together to form tight, hairline joints.
  - 2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
  - 3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
  - 4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 5. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
  - 6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (6 mm in 3.5 m).
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
  - 1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

### 3.2 ANCHORING POSTS

- A. Form or core-drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Anchor posts to metal surfaces with flanges, angle type, or floor type, as required by conditions, connected to posts and to metal supporting members as follows:
- C. Install removable railing sections, where indicated on Drawing, in slip-fit stainless steel sockets cast in concrete.

### 3.3 ATTACHING RAILINGS

- A. Attach handrails to walls with wall brackets. Provide brackets with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface.
- B. Secure wall brackets to building construction as follows:
  - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
  - 2. For hollow masonry anchorage, use toggle bolts.
  - 3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
- C. Touchup Painting:
  - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

### 3.4 CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 52 13

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### PART 1 - GENERAL

### 1.1 SUMMARY

### A. Section Includes:

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

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
- 1.3 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. Engineered wood products.
    - 4. Shear panels.
    - 5. Power-driven fasteners.
    - 6. Post-installed anchors.
    - 7. Metal framing anchors.

### 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, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber 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. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

### 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA 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.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium

- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. 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.
- D. Application: Treat items indicated on Drawings, and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
  - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  - 4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
  - 5. Wood floor plates that are installed over concrete slabs-on-grade.

### 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply 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 (3.2 m) beyond the centerline of the burners at any time during the test.
  - 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardanttreated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
  - 2. 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.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings, and the following:
  - 1. Concealed blocking.
  - 2. Framing for non-load-bearing partitions.
  - 3. Framing for non-load-bearing exterior walls.
  - 4. Roof construction.
  - 5. Plywood backing panels.

### 2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Standard, Stud, or No. 3 grade.
  - 1. Application: Interior partitions not indicated as load bearing.
  - 2. Species:
    - a. Western woods; WCLIB or WWPA.
- B. Framing Other Than Non-Load-Bearing Partitions: No. 2 Except as noted in plans.
  - 1. Application: Framing other than interior partitions not indicated as load bearing.
  - 2. Species:
    - a. Douglas fir-larch; WCLIB or WWPA.
- C. Exposed Framing: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knotholes, shake, splits, torn grain, and wane.
  - 1. Species and Grade: As indicated above for load-bearing construction of same type.
- 2.5 ENGINEERED WOOD PRODUCTS
  - A. Engineered Wood Products, General: Products shall contain no urea formaldehyde.

- B. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
  - 1. Extreme Fiber Stress in Bending, Edgewise: 2600 psi.
  - 2. Modulus of Elasticity, Edgewise: 1,900,000 psi .
- C. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Comply with material requirements of and with structural capacities established and monitored according to ASTM D 5055.
  - 1. Comply with APA PRI-400. Factory mark I-joists with APA-EWS trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA-EWS standard.
- D. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research or evaluation report for I-joists.
  - 1. Comply with APA PRR-401, rim board grade. Factory mark rim boards with APA-EWS trademark indicating thickness, grade, and compliance with APA-EWS standard.

### 2.6 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Rooftop equipment bases and support curbs.
  - 4. Cants.
  - 5. Furring.
  - 6. Grounds.
- B. Dimension Lumber Items: Standard, Stud, or No. 3 grade lumber of any species.

### 2.7 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, C-C Plugged, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.
  - 1. Plywood 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."

### 2.8 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall 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/A 153M.
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, as appropriate for the substrate.

### PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
  - A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
  - B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- D. Install shear wall panels to comply with manufacturer's written instructions.
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
  - 2. 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.
  - 3. ICC-ES evaluation report for fastener.

### 3.2 PROTECTION

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

END OF SECTION 06 10 00

### SECTION 06 16 00 - SHEATHING

### PART 1 - GENERAL

### 1.1 SUMMARY

## A. Section Includes:

- 1. Wall sheathing.
- 2. Roof sheathing.
- 3. Composite nail base insulated roof sheathing.
- 4. Subflooring.
- 5. Underlayment.
- 6. Sheathing joint and penetration treatment.

### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

# 2.2 WALL SHEATHING

- A. Plywood Sheathing: Exterior, Structural I sheathing.
- B. Oriented-Strand-Board Sheathing: Exposure 1, Structural I.

### 2.3 ROOF SHEATHING

- A. Plywood Sheathing: Exterior, Structural I sheathing.
- B. Oriented-Strand-Board Sheathing: Exposure 1, Structural I sheathing.

### 2.4 FLOOR SHEATHING

- A. Plywood Sheathing: Exterior, Structural I sheathing.
- B. Oriented-Strand-Board Sheathing: Exposure 1, Structural I sheathing.

### 2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

### PART 3 - EXECUTION

# 3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
  - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
  - 3. ICC-ES evaluation report for fastener.

- D. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- 3.2 WOOD STRUCTURAL PANEL INSTALLATION
  - A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
  - B. Fastening Methods: Fasten panels as indicated below:
    - 1. Floor Sheathing:
      - a. Glue and nail to wood framing.
      - b. Space panels 1/8 inch (3 mm) apart at edges and ends.
    - 2. Wall and Roof Sheathing:
      - a. Nail to wood framing.
      - b. Space panels 1/8 inch (3 mm) apart at edges and ends.
      - c. Fill and sand edge joints of underlayment receiving resilient flooring immediately before installing flooring.

END OF SECTION 06 16 00

## PART 1 - GENERAL

### 1.1 SUMMARY

# A. Section Includes:

- 1. Plastic-laminate-clad architectural cabinets.
- 2. Cabinet hardware and accessories.
- 3. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Sustainable Design Submittals:
  - 1. <u>Product Data</u>: For adhesives, indicating that product contains no urea formaldehyde.
- C. Shop Drawings: 1. Include plans, elevations, sections, and attachment details.
- D. Samples: For each exposed product and for each color and texture specified.
- 1.3 INFORMATIONAL SUBMITTALS
  - A. Research reports.
  - B. Field quality control reports.
- 1.4 FIELD CONDITIONS
  - A. Environmental Limitations without Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

### PART 2 - PRODUCTS

## 2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
- B. Architectural Woodwork Standards Grade: Custom.
- C. Type of Construction: Face frame.
- D. Door and Drawer-Front Style: Reveal overlay.
  - 1. Reveal Dimension: 1/2 inch (13 mm).
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
- F. Laminate Cladding for Exposed Surfaces:
  - 1. Horizontal Surfaces: Grade HGS.
  - 2. Postformed Surfaces: Grade HGP.
  - 3. Vertical Surfaces: Grade HGS.
  - 4. Edges: PVC tape, 0.018-inch (0.460-mm) minimum thickness, matching laminate in color, pattern, and finish.
  - 5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

- G. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
  - 1. Join subfronts, backs, and sides with glued dovetail joints.
- I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. As selected by Architect from laminate manufacturer's full range in the following categories:
    - a. Wood grains, matte finish.
    - b. Patterns, matte finish.

## 2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 1. <u>Recycled Content of MDF and Particleboard</u>: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
  - 2. <u>Composite Wood Products</u>: Verify products are made without added urea formaldehyde.
  - 3. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
  - 4. Softwood Plywood: DOC PS 1, medium-density overlay.
  - 5. Thermally Fused Laminate (TFL) Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

# 2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 08 71 00 "Door Hardware."
- B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 135 degrees of opening.
- C. Wire Pulls: Back mounted, solid metal, 5 inches (127 mm) long, 2-1/2 inches (63.5 mm) deep, and 5/16 inch (8 mm) in diameter.
- D. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141.
- E. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.
- F. Drawer Slides: ANSI/BHMA A156.9.
  - 1. Standard Duty (Grade 1 and Grade 2): Side mount and extending under bottom edge of drawer.
  - 2. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Undermount.
    - a. Type: Full extension.
    - b. Material: Zinc-plated ball bearing slides.
    - c. Motion Feature: Self-closing mechanism.
- G. Door Locks: ANSI/BHMA A156.11, E07121.
- H. Drawer Locks: ANSI/BHMA A156.11, E07041.
- I. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.
- J. Grommets for Cable Passage: 2-inch (51-mm) OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
  - 1. Color: Black.
- K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.

- 1. Satin Brass, Blackened, Bright Relieved, Clear Coated: ANSI/BHMA 610 for brass base; ANSI/BHMA 636 for steel base.
- L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

### 2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. <u>Adhesives</u>: Do not use adhesives that contain urea formaldehyde.
- D. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
  1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

### 2.5 FABRICATION

- A. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- C. Install glass to comply with applicable requirements in Section 08 80 00 "Glazing" and in GANA's "Glazing Manual."
  - 1. For glass in frames, secure glass with removable stops.
  - 2. For exposed glass edges, polish and grind smooth.

### PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.
- B. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) using concealed shims.
  - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
  - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood framing, blocking, or hanging strips.

END OF SECTION 06 41 16

## SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Cold-applied, cut-back-asphalt dampproofing.
  - 2. Cold-applied, emulsified-asphalt dampproofing.

# 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

# PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
  - A. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise indicated.
- 2.2 COLD-APPLIED, CUT-BACK-ASPHALT DAMPPROOFING
  - A. Trowel Coats: ASTM D4586/D4586M, Type I, Class 1, fibered.
  - B. Brush and Spray Coats: ASTM D4479/D4479M, Type I, fibered.
- 2.3 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING
  - A. Trowel Coats: ASTM D1227, Type II, Class 1.
  - B. Fibered Brush and Spray Coats: ASTM D1227, Type II, Class 1.
  - C. Brush and Spray Coats: ASTM D1227, Type III, Class 1.

### 2.4 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Emulsified-Asphalt Primer: ASTM D1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
- C. Asphalt-Coated Glass Fabric: ASTM D1668/D1668M, Type I.

# PART 3 - EXECUTION

# 3.1 APPLICATION, GENERAL

- A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless otherwise indicated.
  - 1. Apply dampproofing to provide continuous plane of protection.
  - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
- B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches (150 mm) over outside face of footing.
  - 1. Extend dampproofing 12 inches (300 mm) onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
  - 2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where indicated as "reinforced," by embedding an 8-inch- (200-mm-

) wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

- C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch (6 mm) onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.
  - 1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
  - 2. Lap dampproofing at least 1/4 inch (6 mm) onto shelf angles supporting veneer.
- 3.2 COLD-APPLIED, CUT-BACK-ASPHALT DAMPPROOFING
  - A. Concrete Foundations: Apply two brush or spray coats at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat or one trowel coat at not less than 4 gal./100 sq. ft. (1.6 L/sq. m).
  - B. Unparged Masonry Foundation Walls: Apply primer and two brush or spray coats at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat or primer and one trowel coat at not less than 4 gal./100 sq. ft. (1.6 L/sq. m).
  - C. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m).
  - D. Unexposed Face of Masonry Retaining Walls: Apply primer and one brush or spray coat at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m).

### 3.3 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Concrete Foundations: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. (0.6 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat one fibered brush or spray coat at not less than 3 gal./100 sq. ft. (1.2 L/sq. m) or one trowel coat at not less than 4 gal./100 sq. ft. (1.6 L/sq. m).
- B. Unparged Masonry Foundation Walls: Apply primer and two brush or spray coats at not less than 1.5 gal./100 sq. ft. (0.6 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat primer and one fibered brush or spray coat at not less than 3 gal./100 sq. ft. (1.2 L/sq. m) or primer and one trowel coat at not less than 5 gal./100 sq. ft. (2 L/sq. m).
- C. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m).
- D. Unexposed Face of Masonry Retaining Walls: Apply primer and one brush or spray coat at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m).

# 3.4 PROTECTION COURSE INSTALLATION

A. Install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.

END OF SECTION 07 11 13

### SECTION 07 21 00 - THERMAL INSULATION

### PART 1 - GENERAL

- 1.1 SUMMARY
  - A. Section Includes:1. Mineral-wool board insulation.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
   1. Mineral-wool board insulation.
- B. Sustainable Design Submittals:
  - 1. <u>Product Data</u>: For adhesives, indicating VOC content.
  - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- 1.3 INFORMATIONAL SUBMITTALS
  - A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.
    - 1. Sign, date, and post the certification in a conspicuous location on Project site.
  - B. Product test reports.
  - C. Research reports.

### PART 2 - PRODUCTS

- 2.1 MINERAL-WOOL BOARD INSULATION
  - A. <u>Recycled Content</u>: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 40 percent.
  - B. Mineral-Wool Board Insulation, Types IA and IB, Unfaced: ASTM C612, Types IA and IB; passing ASTM E136 for combustion characteristics.
    - 1. Nominal Density: 4 lb/cu. ft. (64 kg/cu. m).
    - 2. Flame-Spread Index: Not more than 15 when tested in accordance with ASTM E84.
    - 3. Smoke-Developed Index: Not more than zero when tested in accordance with ASTM E84.
    - 4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches (305 mm) and wider in width.
  - C. Mineral-Wool Board Insulation, Types IA and IB, Faced: ASTM C612, Types IA and IB; faced on one side with foil-scrim or foil-scrim-polyethylene vapor retarder.
    - 1. Nominal Density: 4 lb/cu. ft. (64 kg/cu. m).
    - 2. Flame-Spread Index: Not more than 15 when tested in accordance with ASTM E84.
    - 3. Smoke-Developed Index: Not more than zero when tested in accordance with ASTM E84.
    - 4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches (305 mm) and wider in width.

# 2.2 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
  - 1. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flamespread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
  - 2. Polyurethane Pour-In-Place Insulation: Closed cell, with maximum flame-spread and smokedeveloped indexes of 75 and 450, respectively, per ASTM E84, specifically formulated for pour-inplace applications.
- B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.

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- C. 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.
  - 1. <u>Verify adhesives have a VOC</u> content of 70 g/L or less.

# PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
  - A. Comply with insulation manufacturer's written instructions applicable to products and applications.
  - 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. Install insulation with manufacturer's R-value label exposed after insulation is installed.
  - D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
  - E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

# 3.2 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
  - 1. If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) below exterior grade line.

# 3.3 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit.
- B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors.
- C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

END OF SECTION 07 21 00

### SECTION 07 27 26 - FLUID-APPLIED MEMBRANE AIR BARRIERS

## PART 1 - GENERAL

## 1.1 SUMMARY

A. Section Includes:1. Vapor-permeable, fluid-applied air barriers.

## 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

# 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. <u>Product Data</u>: For coatings, indicating VOC content.
  - 2. Laboratory Test Reports: For coatings, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For air-barrier assemblies.
  - 1. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

# 1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.
- C. Field quality-control reports.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to set quality standards for materials and execution.
  - 1. Build integrated mockups of exterior wall assembly, 150 sq. ft. (14 sq. m), incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
    - a. Coordinate construction of mockups to permit inspection and testing of air barrier before external insulation and cladding are installed.
    - b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.

### PART 2 - PRODUCTS

- 2.1 MATERIALS
  - A. <u>VOC Content</u>: 100 g/L or less.

# 2.2 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E2357.

### 2.3 MEDIUM-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. Medium-Build, Vapor-Permeable Air Barrier: Synthetic polymer material with an installed dry film thickness, according to manufacturer's written instructions, of 17 to 30 mils (0.4 to 0.8 mm) over smooth, void-free substrates.

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. 3M Industrial Adhesives and Tapes Division.
- b. DuPont Safety & Construction.
- c. GE Construction Sealants; Momentive Performance Materials Inc.
- d. Sto Corp.
- e. W.R. Meadows, Inc.
- 2. Physical and Performance Properties:
  - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E2178.
  - b. Vapor Permeance: Minimum 10 perms (580 ng/Pa x s x sq. m); ASTM E96/E96M, Desiccant Method, Procedure A.
  - c. Ultimate Elongation: Minimum 250 percent; ASTM D412, Die C.
  - d. Adhesion to Substrate: Minimum 30 lbf/sq. in. (207 kPa) when tested according to ASTM D4541.
  - e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
  - f. UV Resistance: Can be exposed to sunlight for 180 days according to manufacturer's written instructions.

# 2.4 ACCESSORY MATERIALS

A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

### PART 3 - EXECUTION

### 3.1 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- D. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- F. Bridge discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

# 3.2 INSTALLATION

A. Install materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.

- 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
- 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate.
- 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
- 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtainwall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames, with not less than 1 inch (25 mm) of full contact.
- D. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.
- E. Medium-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.
  - 1. Vapor-Permeable, Medium-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, applied in one or more equal coats. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based.
- F. Do not cover air barrier until it has been tested and inspected by testing agency.
- G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.
- 3.3 FIELD QUALITY CONTROL
  - A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
  - B. Tests: As determined by testing agency from among the following tests:
    - 1. Air-barrier dry film thickness.
    - 2. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E1186, chamber depressurization using detection liquids.
    - 3. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E783 or ASTM E2357.
    - 4. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D4541 for each 600 sq. ft. (56 sq. m) of installed air barrier or part thereof.
  - C. Air barriers will be considered defective if they do not pass tests and inspections.
    - 1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
    - 2. Remove and replace deficient air-barrier components for retesting as specified above.
  - D. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
  - E. Prepare test and inspection reports.

### 3.4 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
- B. Remove masking materials after installation.

END OF SECTION 07 27 26

## SECTION 07 41 13.16 - STANDING-SEAM METAL ROOF PANELS

# PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:1. Standing-seam metal roof panels.
- 1.2 PREINSTALLATION MEETINGS
  - A. Preinstallation Conference: Conduct conference at Project site.
- 1.3 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
  - B. Sustainable Design Submittals:
    - 1. <u>Product Test Reports</u>: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirements.
  - C. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
  - D. Samples: For each type of metal panel indicated.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranties: Sample of special warranties.
- 1.5 CLOSEOUT SUBMITTALS
  - A. Maintenance data.
- 1.6 QUALITY ASSURANCE
  - A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
  - B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.
- 1.7 WARRANTY
  - A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
     1. Warranty Period: Two years from date of Substantial Completion.
  - B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
    - 1. Finish Warranty Period: 20 years from date of Substantial Completion.
  - C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
    - 1. Warranty Period: 20 years from date of Substantial Completion.

### PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. <u>Recycled Content</u>: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 24 percent.
- B. <u>Solar Reflectance Index (SRI)</u>: Three-year-aged SRI not less than 23 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- C. Energy Performance: Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for steep-slope roof products.
- D. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
  - 1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
  - 2. Three-year, aged Solar Reflectance Index of not less than 64 when calculated according to ASTM E1980.
- E. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Other Design Loads: As indicated on Drawings.
  - 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- F. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- G. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- H. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E2140.
- I. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-upliftresistance class indicated.
  - 1. Uplift Rating: UL 60.
- J. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
  - 1. Fire/Windstorm Classification: Class 1A- 90.
  - 2. Hail Resistance: MH.
- K. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

# 2.2 STANDING-SEAM METAL ROOF PANELS

- A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
  - 1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1514.
  - 2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1637.
- B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by

mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

- 1. Basis-of-Design: DMC150SL by Drexel Metals
- 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. ĆENTRIA
  - b. Drexel Metals
  - c. Englert
  - d. MBCI
  - e. McElroy Metal, Inc.
  - f. Morin A Kingspan Group
  - g. PAC-CLAD; Petersen Aluminum
  - h. Equal as approved by Architect prior to bidding.
- 3. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
  - a. Nominal Thickness: 0.025 inch (0.635 mm).
  - b. Exterior Finish: Three-coat fluoropolymer.
  - c. Color: Weathered Zinc .
- 4. Clips: One-piece fixed to accommodate thermal movement.
  - a. Material: 0.028-inch- (0.71-mm-) nominal thickness, zinc-coated (galvanized) or aluminumzinc alloy-coated steel sheet.
- 5. Panel Coverage: 12 inches (305 mm).
- 6. Panel Height: 1.5 inches (38 mm).

# 2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
  - 1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D1970.
  - 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D1970.
- B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

## 2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
  - 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
  - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  - Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Gutters and Downspouts: Formed from same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual." Finish to match metal roof panels.
- E. Panel Fasteners: Self-tapping screws designed to withstand design loads.

- F. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
  - 2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
  - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

# 2.5 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

### 2.6 FINISHES

- A. Panels and Accessories:
  - 1. Three-Coat Fluoropolymer: AAMA 621 or AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.
  - 2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

# PART 3 - EXECUTION

### 3.1 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

# 3.2 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.
   Apply over the entire roof surface.
- B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.
- C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 07 62 00 "Sheet Metal Flashing and Trim."

### 3.3 INSTALLATION OF STANDING SEAM METAL ROOF PANELS

- A. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
  - 1. Install clips to supports with self-tapping fasteners.
  - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  - 3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
  - 4. Watertight Installation:
    - Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
       Provide sealant or tape between panels and protruding equipment vents, and accessories
      - Provide sealant or tape between panels and protruding equipment, vents, and accessories. STANDING SEAM METAL ROOF PANELS

- c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.
- B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- C. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

# 3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 07 41 13.16

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### SECTION 07 71 00 - ROOF SPECIALTIES

# PART 1 - GENERAL

#### 1.1 SUMMARY

#### Α. Section Includes:

- 1. Copings.
- Roof-edge specialties. 2.
- Roof-edge drainage systems. 3.
- Reglets and counterflashings. 4.
- Β. Preinstallation Conference: Conduct conference at Project site.

#### 1.2 ACTION SUBMITTALS

- Α. Product Data: For each type of product.
- Β. Sustainable Design Submittals:
  - 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
- C. Shop Drawings: For roof specialties.
  - Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. 1. Distinguish between plant- and field-assembled work.
- Samples: For each type of roof specialty and for each color and texture specified. D.

#### INFORMATIONAL SUBMITTALS 1.3

- Product Test Reports: For tests performed by a qualified testing agency. Α.
- Β. Sample warranty.

#### 1.4 CLOSEOUT SUBMITTALS

Α. Maintenance Data: For roofing specialties to include in maintenance manuals.

#### 1.5 QUALITY ASSURANCE

Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are Α. SPRI ES-1 tested to specified design pressure.

#### 1.6 WARRANTY

- Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 07 54 23, Α. "Thermoplastic-Poloyolefin (TPO) Roofing."
- Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that Β. show evidence of deterioration of factory-applied finishes within specified warranty period. 1.
  - Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
    - Color fading more than 5 Delta E units when tested according to ASTM D2244. a.
    - Chalking in excess of a No. 8 rating when tested according to ASTM D4214. b.
  - Cracking, checking, peeling, or failure of paint to adhere to bare metal. C.
  - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less Α. than 25 percent.
- Β. SPRI Wind Design Standard: Manufacture and install copings and roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:
  - Design Pressure: As indicated on Drawings. 1.
- Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to C. prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material 1. surfaces.

### 2.2 COPINGS

- Α. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet (3.6 m), concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.
  - 1. Metallic-Coated Steel Sheet Coping Caps: Zinc-coated (galvanized) steel, nominal 0.034-inch (0.86-mm) thickness.
    - Surface: Smooth. flat finish. a.
    - Finish: Three-coat fluoropolymer. b.
    - Color: As selected by Architect from manufacturer's full range. C.
  - Corners: Factory mitered and continuously welded. 2.
  - Coping-Cap Attachment Method: face leg hooked to continuous cleat with back leg fastener 3 exposed, fabricated from coping-cap material.
    - Snap-on Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches (300 mm) a. wide, with integral cleats.
    - Face-Leg Cleats: Concealed, continuous galvanized-steel sheet. b.

#### 2.3 **ROOF-EDGE SPECIALTIES**

- Α. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet (3.6 m) and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure single-ply roof membrane. Provide matching corner units.
  - Basis-of-Design: MAC Metal Architectural (www.macmetalarchitectural.com). See specific model 1. numbers as indicated on the Contract Documents.
  - 2. Metallic-Coated Steel Sheet Fascia Covers: Zinc-coated (galvanized) steel, nominal 0.034-inch (0.86-mm) thickness.
    - a. Surface: Smooth. flat finish.
    - Finish: Three-coat fluoropolymer. b.
    - Color: As selected by Architect from manufacturer's full range. C.
    - Corners: Factory mitered and continuously welded.
  - 3. Splice Plates: Exposed, of same material, finish, and shape as fascia cover. 4.
  - Receiver: Galvanized-steel sheet, nominal 0.040-inch (1.02-mm) thickness. 5.
  - Fascia Accessories: Wall cap. 6

#### 2.4 **ROOF-EDGE DRAINAGE SYSTEMS**

- Gutters: Manufactured in uniform section lengths not exceeding 12 feet (3.6 m), with matching corner Α. units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch (25 mm) above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.
  - Zinc-Coated Steel: Nominal 0.034-inch (0.86-mm) thickness. 1.
  - 2. Gutter Profile: Half-round highback according to SMACNA's "Architectural Sheet Metal Manual."
  - 3. Corners: Factory mitered and continuously welded.
  - 4. Gutter Supports: Manufacturer's standard supports as selected by Architect with finish matching the gutters.

- 5. Gutter Accessories: Continuous screened leaf guard with sheet metal frame and Bronze wire ball downspout strainer.
- B. Downspouts: Plain round complete with elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
   1. Zinc-Coated Steel: Nominal 0.034-inch (0.86-mm) thickness.
  - - Zinc-Coated Steel Finish: Three-coat fluoropolymer. 1. Color: As selected by Architect from manufacturer's full range.

# 2.5 REGLETS AND COUNTERFLASHINGS

- A. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
  - 1. Zinc-Coated Steel: Nominal 0.028-inch (0.71-mm) thickness.
  - 2. Corners: Factory mitered and continuously welded.
  - 3. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
- B. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches (100 mm) and in lengths not exceeding 12 feet (3.6 m) designed to snap into and compress against base flashings with joints lapped, from the following exposed metal:
  - 1. Zinc-Coated Steel: Nominal 0.028-inch (0.71-mm) thickness.
- C. Accessories:

C.

- 1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
- 2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
- D. Zinc-Coated Steel Finish: Three-coat fluoropolymer.
  - 1. Color: As selected by Architect from manufacturer's full range.

# 2.6 MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 (Z275) coating designation.

# 2.7 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slipresisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
  - 1. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F (116 deg C).
  - 2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F (29 deg C).
- B. Slip Sheet: Rosin-sized building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum.

# 2.8 MISCELLANEOUS MATERIALS

- A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
  - 1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
  - 2. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
  - 3. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
  - 4. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
  - 5. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinccoated steel according to ASTM A153/A153M or ASTM F2329.
- B. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

- C. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.
- D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- E. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

# 2.9 FINISHES

- A. Coil-Coated Galvanized-Steel Sheet Finishes:
  - High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with ASTM A755/A755M and coating and resin manufacturers' written instructions.
    - a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.

# PART 3 - EXECUTION

1.

# 3.1 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.
  - 1. Apply continuously under copings, roof-edge specialties and reglets and counterflashings.
  - 2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.
- B. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

# 3.2 INSTALLATION, GENERAL

- A. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.
  - 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
  - 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
  - 3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
  - 4. Torch cutting of roof specialties is not permitted.
  - 5. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
  - 1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
  - 2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
  - 1. Space movement joints at a maximum of 12 feet (3.6 m) with no joints within 18 inches (450 mm) of corners or intersections unless otherwise indicated on Drawings.
  - 2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
- E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

# 3.3 INSTALLATION OF COPING

- A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.
  - 1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.

## 3.4 INSTALLATION OF ROOF-EDGE SPECIALITIES

- A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

# 3.5 INSTALLATION OF ROOF-EDGE DRAINAGE-SYSTEM

- A. Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.
- B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches (610 mm) apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.
  - 1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet (15.2 m) apart. Install expansion-joint caps.
  - 2. Install continuous leaf guards on gutters with noncorrosive fasteners, hinged to swing open for cleaning gutters.
- C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c.
  - 1. Provide elbows at base of downspouts at grade to direct water away from building.
  - 2. Connect downspouts to underground drainage system indicated.

# 3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 07 71 00

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### SECTION 07 72 53 - SNOW GUARDS

### PART 1 - GENERAL

- 1.1 SUMMARY
  - A. Section Includes:1. Rail-type, seam-mounted snow guards.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include roof plans showing layouts and attachment details of snow guards.
   1. Include details of rail-type snow guards.
- C. Samples: 1. Rai
  - Rail-Type Snow Guards: Bracket, 12-inch- (300-mm-) long rail, and installation hardware.
    - a. For units with factory-applied finishes, submit manufacturer's standard color selections.
- D. Delegated-Design Submittal: For snow guards, include analysis reports signed and sealed by the qualified professional engineer responsible for their preparation.
  - 1. Include calculation of number and location of snow guards.

# 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that the engineer is licensed in the state in which the Project is located.
- B. Product Test Reports: For each type of snow guard, for tests performed by a qualified testing agency, indicating load at failure of attachment to roof system identical to roof system used on this Project.

### PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design snow guards, including attachment to roofing material and roof deck, applicable for attachment method, based on the following:
  - 1. Roof snow load.
  - 2. Snow drifting
  - 3. Roof slope.
  - 4. Roof type.
  - 5. Roof dimensions.
  - 6. Roofing substrate type and thickness.
  - 7. Snow guard type.
  - 8. Snow guard fastening method and strength.
  - 9. Snow guard spacing.
  - 10. Coefficient of Friction Between Snow and Roof Surface: 0.
  - 11. Factor of Safety: 2.
- B. Performance Requirements: Provide snow guards that withstand exposure to weather and resist thermally induced movement without failure, rattling, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- C. Structural Performance: Snow guards shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
  - 1. Snow Loads: As indicated on Drawings.

# 2.2 RAIL-TYPE SNOW GUARDS

- A. Rail-Type, Seam-Mounted Snow Guards:
  - 1. Subject to compliance with requirements, available manufacturer's offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Alpine Snow Guards
    - b. Berger Building Products
    - c. IceBlox, Inc.
    - d. PMC Industrias, Ltd.
    - e. TRA Snow and Sun, Inc.
  - 2. Description: Snow guard rails fabricated from metal pipes, bars, or extrusions, anchored to brackets and equipped with two rails.
  - 3. Brackets and Baseplates: ASTM B209 (ASTM B209M) aluminum; mill finish.
  - 4. Bars: ASTM B221 (ASTM B221M) aluminum; mill finish.
    - a. Profile: Round.
  - 5. Seam clamps: ASTM B221 (ASTM B221M) aluminum extrusion or ASTM B85/B85M aluminum casting with stainless steel set screws incorporating round nonpenetrating point; designed for use with applicable roofing system to which clamp is attached.

### PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Install snow guards according to manufacturer's written instructions.
   1. Space rows as recommended by manufacturer.
- B. Attachment for Standing-Seam Metal Roofing:
  - 1. Do not use fasteners that will penetrate metal roofing or fastening methods that void metal roofing finish warranty.
  - 2. Pad-Type, Flat-Mounted Snow Guards:
    - a. Mechanically attach to metal roofing according to manufacturer's instructions.
  - 3. Rail-Type, Seam-Mounted Snow Guards:
    - a. Install brackets to vertical ribs in straight rows.
    - b. Secure with stainless steel set screws, incorporating round nonpenetrating point, on same side of standing seam.
    - c. Torque set screw according to manufacturer's instructions.
    - d. Install cross members to brackets.

END OF SECTION 07 72 53

### PART 1 - GENERAL

1.1 SUMMARY

### A. Section Includes:

- 1. Nonstaining silicone joint sealants.
- 2. Urethane joint sealants.
- 3. Mildew-resistant joint sealants.
- 4. Latex joint sealants.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Sustainable Design Submittals:
  - 1. <u>Product Data</u>: For sealants, indicating VOC content.
  - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
- C. Samples: For each kind and color of joint sealant required.
- D. Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.

# 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Preconstruction laboratory test reports.
- C. Preconstruction field-adhesion-test reports.
- D. Field-adhesion-test reports.
- E. Sample warranties.
- 1.4 QUALITY ASSURANCE
  - A. Testing Agency Qualifications: Qualified according to ASTM C1021 to conduct the testing indicated.

### 1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
  - 1. Adhesion Testing: Use ASTM C794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
  - 2. Compatibility Testing: Use ASTM C1087 to determine sealant compatibility when in contact with glazing and gasket materials.
  - 3. Stain Testing: Use ASTM C1248 to determine stain potential of sealant when in contact with masonry substrates.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

## 1.6 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace 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.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

# PART 2 - PRODUCTS

- 2.1 JOINT SEALANTS, GENERAL
  - A. <u>VOC Content</u>: Verify sealants and sealant primers comply with the following:
    - 1. Architectural sealants have a VOC content of 250 g/L or less.
    - 2. Sealants and sealant primers for nonporous substrates have a VOC content of 250 g/L or less.
    - 3. Sealants and sealant primers for porous substrates have a VOC content of 775 g/L or less.
  - B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

# 2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C1248.
- B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.

### 2.3 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
- B. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade P, Class 25, Uses T and NT.
- 2.4 MILDEW-RESISTANT JOINT SEALANTS
  - A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
  - B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
  - C. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

### 2.5 JOINT-SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.
- 2.6 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 backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

# PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with jointsealant manufacturer's written instructions and the following requirements:
  - 1. Remove laitance and form-release agents from concrete.
  - 2. 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.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

# 3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Install sealant backings of kind 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.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that 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.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   1. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.

# 3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
  - 1. Extent of Testing: Test completed and cured sealant joints as follows:
    - a. Perform one test for each 1000 feet (300 m) of joint length thereafter or one test per each floor per elevation.
  - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

### 3.4 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 1. Joint Locations:

- a. Construction joints in cast-in-place concrete.
- b. Control and expansion joints in unit masonry.
- c. Joints in dimension stone cladding.
- d. Other joints as indicated on Drawings.
- 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
- 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
  - 1. Joint Locations:
    - a. Isolation joints in cast-in-place concrete slabs.
    - b. Other joints as indicated on Drawings.
    - 2. Joint Sealant: Urethane, S, P, 25, T, NT.
    - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces. 1. Joint Locations:
  - a. Control and expansion joints on exposed interior surfaces of exterior walls.
  - b. Tile control and expansion joints.
  - c. Vertical joints on exposed surfaces of unit masonry concrete walls.
  - d. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Urethane, S, NS, 25, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
  - 1. Joint Locations:
    - a. Control joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
    - c. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Acrylic latex.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
  - 1. Joint Locations:
    - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - b. Tile control and expansion joints where indicated.
    - c. Other joints as indicated on Drawings.
    - Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Concealed mastics.
  - 1. Joint Locations:
    - a. Aluminum thresholds.
    - b. Sill plates.
    - c. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Butyl-rubber based.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 92 00

2.

### SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

# PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. Section includes:
  - 1. Interior standard steel doors and frames.
  - 2. Exterior standard steel doors and frames.

# 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. <u>Product Data</u>: For recycled content, indicating postconsumer and preconsumer recycled content.
- C. Shop Drawings: Include the following:
  - 1. Elevations of each door type.
  - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
  - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
- D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Field quality control reports.
- 1.5 CLOSEOUT SUBMITTALS
  - A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

### 1.6 QUALITY ASSURANCE

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:
   1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.
- B. Egress Door Inspector Qualifications: Inspector for field quality control inspections of egress door assemblies shall meet the qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:
   1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

# PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Ceco Door: ASSA ABLOY.
  - 2. Curries Company: ASSA ABLOY.
  - 3. North American Door Corp.
  - 4. Rocky Mountain Metals, Inc.

5. Steelcraft; an Allegion brand.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - Smoke- and Draft-Control Door Assemblies: 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.
- B. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.38 deg Btu/F x h x sq. ft. (2.16 W/K x sq. m) when tested according to ASTM C518.

### 2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B.
  - 1. Doors:
    - a. Type: As indicated in the Door and Frame Schedule.
    - b. Thickness: 1-3/4 inches (44.5 mm).
    - c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm).
    - d. Edge Construction: Model 2, Seamless.
    - e. Core: Manufacturer's standard.
    - f. Fire-Rated Core: Manufacturer's standard vertical steel stiffener or laminated mineral board core for fire-rated doors.
  - 2. Frames:
    - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
    - b. Construction: Full profile welded.

### 2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B..
  - 1. Doors:
    - a. Type: As indicated in the Door and Frame Schedule.
    - b. Thickness: 1-3/4 inches (44.5 mm).
    - c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm), with minimum A60 (ZF180) coating.
    - d. Edge Construction: Model 2, Seamless.
    - e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
    - f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
    - g. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
    - h. Core: Manufacturer's standard.
    - i. Fire-Rated Core: Manufacturer's standard vertical steel stiffener with insulation or laminated mineral board core for fire-rated doors.
  - 2. Frames:
    - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A60 (ZF180) coating.
    - b. Construction: Full profile welded.

### 2.5 FRAME ANCHORS

- A. Jamb Anchors:
  - 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.

- Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches (610 mm) of frame height above 7 feet (2.1 m).
- 3. Postinstalled Expansion Anchor: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
   1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized according to ASTM A153/A153M, Class B.

### 2.6 MATERIALS

- A. <u>Recycled Content of Steel Products</u>: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- C. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- D. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.
- F. Power-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.
- G. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.
- H. Glazing: Comply with requirements in Section 08 80 00 "Glazing."

### 2.7 FABRICATION

- A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
  - 1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 2. Door Silencers: Except on weather-stripped frames, 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.
- B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
  - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
  - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

### 2.8 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

# PART 3 - EXECUTION

# 3.1 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. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

# 3.2 INSTALLATION

- A. Hollow-Metal Frames: 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 without damage to completed Work.
    - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    - b. Install frames with removable stops located on secure side of opening.
  - 2. Fire-Rated Openings: Install frames according to NFPA 80.
  - 3. Floor Anchors: Secure with postinstalled expansion anchors.
    - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
  - 4. Solidly pack mineral-fiber insulation inside frames.
  - 5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
  - 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  - 7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- B. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
  - 1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
  - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

# 3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Owner will engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
  - 1. Fire-Rated Door Inspections: Inspect each fire-rated door according to NFPA 80, Section 5.2.
  - 2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements according to NFPA 101, Section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

# 3.4 REPAIR

- A. 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.
- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 11 13

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#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes electrically operated sectional doors.
- B. Related Section:
  - 1. Section 033300 "Architectural Concrete" for cast-in-place concrete wainscot.
  - 2. Section 133419 "Metal Building systems" for pre-engineered metal building structure and insulated metal wall panels.
  - 3. Division 26 "Electrical" for electrical power and control requirements.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
- B. Delegated Design: Design sectional doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
  - 1. Wind Loads: Uniform pressure (velocity pressure) of 24 lbf/sq. ft. (1,152 Pa), acting inward and outward.
- D. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283 or DASMA 105.
  - 1. Air Infiltration: Maximum rate of 0.08 cfm/sq. ft. (0.406 L/s per sq. m) at 15 and 25 mph (24.1 and 40.2 km/h).
- E. Windborne-Debris-Impact-Resistance Performance: Provide sectional doors that pass large-missileimpact and cyclic-pressure tests when tested according to ASTM E 1886 and ASTM E 1996 or DASMA 115.
- F. Seismic Performance: Sectional doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of sectional door and accessory.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Delegated-Design Submittal: For sectional doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- 1.4 INFORMATIONAL SUBMITTALS
  - A. Seismic Qualification Certificates: For sectional doors, accessories, and components, from manufacturer.
  - B. Warranties: Sample of special warranties.

## 1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

## 1.6 QUALITY ASSURANCE

- A. Wood Door Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Standard for Sectional Doors: Fabricate sectional doors to comply with DASMA 102 unless otherwise indicated.

# 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
  1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

# PART 2 - PRODUCTS

# 2.1 STEEL DOOR SECTIONS

- A. Exterior Section Faces and Frames: Fabricate from manufacturer's standard zinc-coated (galvanized), cold-rolled, steel sheet.
  - 1. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-ingroove weathertight seal, with a reinforcing flange return.
  - 2. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.
- B. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet welded to door section. Provide intermediate stiles formed from galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches (1219 mm) apart.
- C. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile and allowing installation of astragal.
- D. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place. Ensure that reinforcement does not obstruct vision lites.
- E. Provide reinforcement for hardware attachment.
- F. Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard insulation, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within steel sections that incorporate the following interior facing material, with no exposed insulation:
  - 1. Interior Facing Material: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet.

## 2.2 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances shown on Drawings. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced 2 inches (51 mm) apart for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.
- B. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.
- C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.
- D. Windows: Manufacturer's standard window units of type and size indicated and in arrangement shown. Provide removable stops of same material as door-section frames.

# 2.3 HARDWARE

- A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
- B. Hinges: Heavy-duty, galvanized-steel hinges at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails.
- C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Provide 3-inch- (76-mm-) diameter roller tires for 3-inch- (76-mm-) wide track and 2-inch- (51-mm-) diameter roller tires for 2-inch- (51-mm-) wide track.
- D. Push/Pull Handles: For push-up or emergency-operated doors, provide galvanized-steel lifting handles on each side of door.

## 2.4 LOCKING DEVICES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.
- B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded deadbolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
  - 1. Lock Cylinders: Provide cylinders specified in Section 087100 "Door Hardware" and keyed to building keying system.
  - 2. Keys: Three for each cylinder.
- C. Chain Lock Keeper: Suitable for padlock.
- D. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

## 2.5 COUNTERBALANCE MECHANISM

- A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.
- B. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft.
- C. Cables: Galvanized-steel lifting cables.

- D. Cable Safety Device: Include, on each side-edge of door, a device designed to automatically stop door if either lifting cable breaks.
- E. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.
- F. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

# 2.6 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
  - 1. Comply with NFPA 70.
  - 2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Door-Operator Type: Unit of type indicated, consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.
- D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 110513 "Common Motor Requirements for Equipment" unless otherwise indicated.
  - 1. Electrical Characteristics:
    - a. Phase: Single phase.
    - b. Volts: 115 V.
    - c. Hertz: 60.
  - 2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
  - 3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
  - 4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
- E. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
  - 1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction. Provide self-monitoring capability designed to interface with door-operator control circuit to detect damage to or disconnection of sensor device.
  - Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable. Provide self-monitoring capability designed to interface with door-operator control circuit to detect damage to or disconnection of sensor device.
- F. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
  - 1. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
- G. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).
- H. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor

level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

- I. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- J. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.
- K. Radio-Control System: Consisting of three-channel universal coaxial receiver to open, close, and stop door; two per operator.

## 2.7 DOOR ASSEMBLY

- A. Steel Sectional Door: Sectional door formed with hinged sections.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Overhead Door Corporation Model 850 or comparable product by one of the following:
    - a. Clopay Building Products; a Griffon company.
    - b. Raynor.
    - c. Wayne-Dalton Corp.
- B. Operation Cycles: Not less than 50,000.
- C. R-Value: 23 (4.05 m<sup>2</sup>/W.
- D. Steel Sections: Zinc-coated (galvanized) steel sheet, formed into sections 3 inches (76.2 mm) thick.
  1. Exterior-Face Surface: Grooved, Textured.
  - 2. Interior Facing Material: Zinc-coated (galvanized) steel sheet.
- E. Track Configuration: High-lift contour track.
- F. Weatherseals: Fitted to bottom and top of door. Provide combination bottom weatherseal and sensor edge.
- G. Windows: Approximately 25 by 13 inches (635 by 330 mm), with square corners, and spaced apart the approximate distance as indicated on Drawings; in one row at height indicated on Drawings; installed with insulated glazing of clear float glass.
- H. Locking Devices: Equip door with locking device assembly.
  - 1. Locking Device Assembly: Cremone type, both jamb sides, locking bars, operable from inside with thumbturn.
- I. Electric Door Operator:
  - 1. Usage Classification: Heavy duty, 60 to 90 cycles per hour.
  - 2. Operator Type: Jackshaft, side mounted.
  - 3. Motor Exposure: Interior, clean, and dry.
  - 4. Emergency Manual Operation: Push-up type.
  - 5. Obstruction-Detection Device: Automatic photoelectric sensor.
  - 6. Remote-Control Station: Interior.
  - 7. Other Equipment: Radio-control system.
- J. Door Finish:
  - 1. Baked-Enamel or Powder-Coated Finish: Color and gloss as selected by Architect from manufacturer's full range.
  - 2. Factory Prime Finish: Manufacturer's standard color.
  - 3. Finish of Interior Facing Material: Match finish of exterior section face.

# PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Tracks: Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment. Repair galvanized coating on tracks according to ASTM A 780.
- C. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Adjust doors and seals to provide weathertight fit around entire perimeter.

## 3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 08 36 13

#### SECTION 08 80 00 - GLAZING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

# A. Section Includes:

- 1. Glass products.
- 2. Insulating glass.
- 3. Glazing sealants.
- Glazing tapes.
- 5. Miscellaneous glazing materials.

## 1.2 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.
- 1.3 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
  - B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.
  - C. Delegated Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by qualified professional engineer responsible for their preparation.
- 1.4 INFORMATIONAL SUBMITTALS
  - A. Product Certificates: For glass.
  - B. Product test reports.
  - C. Preconstruction adhesion and compatibility test report.
  - D. Sample warranties.

#### 1.5 QUALITY ASSURANCE

A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

#### 1.6 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. 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: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
  - 1. Warranty Period: Five years from date of Substantial Completion.

- C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. AGC Glass Company North America, Inc.
  - 2. Cardinal Glass Industries.
  - 3. Guardian Glass; SunGuard.
  - 4. Oldcastle BuildingEnvelope™.
  - 5. Pilkington North America.
  - 6. Vetrotech Saint-Gobain.

# 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design glazing.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:
  - 1. Design Wind Pressures: As indicated on Drawings.
  - 2. Design Snow Loads: As indicated on Drawings.
  - 3. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.
- C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
  - 1. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
  - 2. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
  - 3. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.
- E. Acoustic Performance:
  - 1. Exterior Glazing: 33 OITC.
  - 2. Interior Glazing: 37 STC.

#### 2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.

- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass is indicated, provide heat-strengthened float glass is indicated, provide heat-strengthened float glass is indicated, provide heat-strengthened float glass is indicated, provide fully tempered float glass.

## 2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
- C. Reflective- and Low-E-Coated Vision Glass: ASTM C1376.
- D. Ceramic-Coated Spandrel Glass: ASTM C1048, Type I, Condition B, Quality-Q3.
- E. Reflective- and Low-E-Coated Spandrel Glass: ASTM C1376, Kind CS.

# 2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.
  - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
  - 2. Perimeter Spacer: Manufacturer's standard spacer material and construction.

# 2.6 GLAZING SEALANTS

- A. General:
  - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of industry colors.
- B. Neutral-Curing Silicone Glazing Sealant, Class 100/50: Complying with ASTM C920, Type S, Grade NS, Use NT.
  - 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. Dow Corning Corporation.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.
    - c. May National Associates, Inc.; a subsidiary of Sika Corporation.
    - d. Sika Corporation.
    - e. Tremco Incorporated.
- C. Neutral-Curing Silicone Glazing Sealant, Class 50: Complying with ASTM C920, Type S, Grade NS, Use NT.
  - 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. BASF Corporation.
    - b. Dow Corning Corporation.
    - c. GE Construction Sealants; Momentive Performance Materials Inc.
    - d. May National Associates, Inc.; a subsidiary of Sika Corporation.
    - e. Sika Corporation.
    - f. Tremco Incorporated.

# 2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
  - 1. AAMA 804.3 tape, where indicated.
  - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
  - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
  - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

# 2.8 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks:
  - 1. Silicone with Shore A durometer hardness of 85, plus or minus 5.
  - 2. Type recommended in writing by sealant or glass manufacturer.
- C. Spacers:
  - 1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
  - 2. Type recommended in writing by sealant or glass manufacturer.
- D. Edge Blocks:
  - 1. Silicone with Shore A durometer hardness per manufacturer's written instructions.
  - 2. Type recommended in writing by sealant or glass manufacturer.
- E. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

#### PART 3 - EXECUTION

- 3.1 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. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
  - C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
  - 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 length plus width is larger than 50 inches (1270 mm).
  - 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 in accordance with requirements in referenced glazing publications.

## 3.2 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Apply heel bead of elastomeric sealant.
- F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G. Apply cap bead of elastomeric sealant over exposed edge of tape.

# 3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: 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 in writing by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

# 3.4 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

# 3.5 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

- 1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

# 3.6 MONOLITHIC GLASS SCHEDULE

- A. Clear Glass Type: Fully tempered float glass.
  - 1. Minimum Thickness: 6 mm.
  - 2. Safety glazing required where indicated on the Drawings.

# 3.7 INSULATING GLASS SCHEDULE

- A. Low-E-Coated, Tinted Insulating Glass Type:
  - 1. Overall Unit Thickness: 1 inch (25 mm).
  - 2. Minimum Thickness of Each Glass Lite: 6 mm.
  - 3. Outdoor Lite: Tinted annealed or Fully tempered float glass, as indicated on the Drawings.
  - 4. Interspace Content: Air.
  - 5. Indoor Lite: Clear annealed or Fully tempered float glass, as indicated on the Drawings.
  - 6. Low-E Coating: Pyrolytic or sputtered on second or third surface.
  - 7. Safety glazing required, where indicated on the Drawings.

END OF SECTION 08 80 00

#### SECTION 08 83 00 - MIRRORS

#### PART 1 - GENERAL

- 1.1 SUMMARY
  - A. Section Includes:1. Silvered flat glass mirrors.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content.
  - 2. <u>Product Data</u>: For adhesives, indicating VOC content.
  - 3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.
- D. Samples: For each type of the following:
  - 1. Mirrors: 12 inches (300 mm) square, including edge treatment on two adjoining edges.
  - 2. Mirror Clips: Full size.
  - 3. Mirror Trim: 12 inches (300 mm) long.

# 1.3 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- 1.4 CLOSEOUT SUBMITTALS
  - A. Maintenance Data: For mirrors to include in maintenance manuals.
- 1.5 QUALITY ASSURANCE
  - A. Installer Qualifications: A qualified Installer, who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- 1.6 PRECONSTRUCTION TESTING

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
  - 1. Warranty Period: Five years from date of Substantial Completion.

#### PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Guardian Glass; SunGuard.
  - 2. National Glass Industries.
  - 3. Trulite Glass & Aluminum Solutions, LLC.
  - 4. Walker Glass Co., Ltd.

## 2.2 SILVERED FLAT GLASS MIRRORS

- A. Mirrors, General: ASTM C1503; manufactured using copper-free, low-lead mirror coating process.
- B. Tempered Glass Mirrors: Mirror Glazing Quality for blemish requirements and complying with ASTM C1048 for Kind FT, Condition A, tempered float glass before silver coating is applied.
   1. Nominal Thickness: 4.0 mm.

#### 2.3 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.
- C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors.
  - 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. Laurence, C. R. Co., Inc.
    - b. Liquid Nails Adhesive.
    - c. Macco Adhesives.
    - d. Pecora Corporation.
  - 2. Verify adhesives have a VOC content of 70 g/L or less.
- D. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

#### 2.4 MIRROR HARDWARE

- A. Aluminum J-Channels: Aluminum 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.
  - 1. Aluminum J Channel Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch (9.5 and 22 mm) in height, respectively, and a thickness of not less than 0.04 inch (1.0 mm).
    - 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) Andscot Company, Inc.
      - 2) Laurence, C. R. Co., Inc.
      - 3) Stylmark, Inc.
  - 2. Finish: Clear bright anodized.
- B. Mirror Top Clips: Two (2) CRL Round Mirror Clips or equal.
- C. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

# 2.5 FABRICATION

- A. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts, so they fit closely around penetrations in mirrors.
- B. Mirror Edge Treatment: Flat polished.
  - 1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
- C. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint, as recommended in writing by film-backing manufacturer, to produce a surface free of bubbles, blisters, and other imperfections.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
- B. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers with mirror mastic.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

#### 3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

## 3.3 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced National Glass Association (NGA) publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
- B. 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.
  - 1. Aluminum J-Channels: Provide setting blocks 1/8 inch (3 mm) thick by 4 inches (100 mm) long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch (6.4 mm) wide by 3/8 inch (9.5 mm) long at bottom channel.
- C. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer and NGA's publication "Proper Procedures for Cleaning Flat Glass Mirrors."

END OF SECTION 08 83 00

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#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Interior gypsum board.
  - 2. Texture finishes.

# 1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Gypsum board, Type X.
  - 2. Interior trim.
  - 3. Joint treatment materials.
  - 4. Sound-attenuation blankets.
  - 5. Textured finishes.

# B. Sustainable Design Submittals:

- 1. Product Data: For recycled content of required elements.
- 2. Product Data: For adhesives and sealants, indicating VOC content.
- 3. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
- C. Samples: For each texture finish indicated on same backing indicated for Work.

#### 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 E119 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 E90 and classified according to ASTM E413 by an independent testing agency.
- 2.2 GYPSUM BOARD, GENERAL
  - A. <u>Recycled Content</u>: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 10 percent.
  - B. 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. Gypsum Board, Type X: ASTM C1396/C1396M.
  - 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. American Gypsum.
    - b. CertainTeed Corporation.
    - c. Georgia-Pacific Gypsum LLC.
    - d. National Gypsum Company.
    - e. PABCO Gypsum.
    - f. USG Corporation.
  - 2. Thickness: 5/8 inch (15.9 mm).
  - 3. Long Edges: Tapered.

#### 2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
  - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
  - 2. Shapes:
    - a. Cornerbead.
      - b. Expansion (control) joint.

# 2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
  - 1. Interior Gypsum Board: Paper.
- 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 joints 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 compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
  - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
  - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

# 2.6 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
  - 1. <u>Verify adhesives have a VOC</u> content of 50 g/L or less.
- C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
  - 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
  - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound-Attenuation Blankets: ASTM C665, 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.
  - 2. <u>Recycled Content</u>: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- E. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

# 2.7 TEXTURE FINISHES

- A. Primer: As recommended by textured finish manufacturer.
- B. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.
  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. CertainTeed Corporation.
    - b. Georgia-Pacific Gypsum LLC.
    - c. National Gypsum Company.
    - d. USG Corporation.
  - 2. Texture: Holy Smooth.

FACILITIES SHOP SPANISH FORK CITY

## PART 3 - EXECUTION

#### 3.1 INSTALLATION AND FINISHING OF PANELS

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- B. Comply with ASTM C840.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) 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.
- D. 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.
- E. Prefill open joints and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
  - 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.
    - a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

#### 3.2 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

#### 3.3 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09 29 00

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## PART 1 - GENERAL

#### 1.1 SUMMARY

## A. Section Includes:

- 1. Thermoplastic-rubber base.
- 2. Rubber stair accessories.
- 3. Rubber molding accessories.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. <u>Product Data</u>: For adhesives, indicating VOC content.
  - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
  - 3. <u>Laboratory Test Reports</u>: For resilient base and stair products and accessories, indicating compliance with requirements for low-emitting materials.
- C. Samples: For each exposed product and for each color and texture specified.

#### PART 2 - PRODUCTS

- 2.1 THERMOPLASTIC-RUBBER BASE (RB)
  - 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. Johnsonite; a Tarkett company.
    - 2. Roppe Corporation, USA.
  - B. Product Standard: ASTM F1861, Type TP (rubber, thermoplastic).
    - 1. Group: I (solid, homogeneous).
    - 2. Style and Location:
      - a. Style A, Straight: Provide in areas with carpet.
      - b. Style B, Cove: Provide in areas with resilient floor coverings.
  - C. Thickness: 0.125 inch (3.2 mm).
  - D. Height: As indicated on Drawings.
  - E. Lengths: Coils in manufacturer's standard length.
  - F. Outside Corners: Preformed.
  - G. Inside Corners: Preformed.
  - H. Colors: As selected by Architect from manufacturer's full product line.

# 2.2 RUBBER STAIR ACCESSORIES

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- 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. Johnsonite; a Tarkett company.
  - 2. Roppe Corporation, USA.
  - 3. Style: Toeless, by length matching treads.
  - 4. Thickness: Manufacturer's standard.

- C. Stringers: Height and length after cutting to fit risers and treads and to cover stair stringers, produced by same manufacturer as treads, and recommended by manufacturer for installation with treads.
  1. Thickness: Manufacturer's standard.
- D. Locations: Provide rubber stair accessories in areas indicated.
- E. Colors and Patterns: As selected by Architect from manufacturer's full product line.
- 2.3 RUBBER MOLDING ACCESSORY
  - 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. Johnsonite; a Tarkett company.
    - 2. Roppe Corporation, USA.
  - B. Description: Rubber transition strips.
  - C. Profile and Dimensions: As selected from selected manufacturer's standard catalog .
  - D. Locations: Provide rubber molding accessories in areas indicated.
  - E. Colors and Patterns: As selected by Architect from manufacturer's full product line.

# 2.4 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. <u>Verify adhesives have a VOC</u> content of 50 g/L or less.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

#### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

# 3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Fill gap at bottom of gypsum board wall finish greater than 3/8 inch (9.525 mm) prior to installation.
- C. 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.
- D. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

- E. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- F. Do not stretch resilient base during installation.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- 3.3 RESILIENT ACCESSORY INSTALLATION
  - A. Comply with manufacturer's written instructions for installing resilient accessories.
  - B. Resilient Stair Accessories:
    - 1. Tightly adhere to substrates throughout length of each piece.
    - 2. For treads installed as separate, equal-length units, install to produce a flush joint between units.
  - C. 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.

# 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Floor Polish: Remove soil, adhesive, and blemishes from resilient stair treads before applying liquid floor polish.
  - 1. Apply two coat(s).
- C. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

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## SECTION 09 65 19 - RESILIENT TILE FLOORING

# PART 1 - GENERAL

- 1.1 SUMMARY
  - Α. Section Includes: 1 Vinyl composition floor tile.

#### 1.2 ACTION SUBMITTALS

- Α. Product Data: For each type of product.
- В. Sustainable Design Submittals:
  - Product Data: For adhesives, indicating VOC content. 1.
  - Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting 2. materials.
  - 3. Product Data: For chemical-bonding compounds, indicating VOC content.
  - Laboratory Test Reports: For chemical-bonding compounds, indicating compliance with 4. requirements for low-emitting materials.
  - Product Data: For sealants, indicating VOC content. 5.
  - Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting 6. materials.
- C. Samples: For each exposed product and for each color and pattern specified.
- CLOSEOUT SUBMITTALS 1.3
  - Α. Maintenance data.
- 1.4 QUALITY ASSURANCE
  - Α. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation.
- PART 2 PRODUCTS
- 2.1 PERFORMANCE REQUIREMENTS
  - Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products Α. according to ASTM E648 or NFPA 253 by a qualified testing agency. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sg. cm.
    - 1.
- 2.2 SOLID VINYL FLOOR TILE (LVT)
  - See drawings for Basis-of-Design. Α.
  - Β. Tile Standard: ASTM F1700.
    - Class: As indicated by product designations. 1.
    - 2. Type: B, Embossed Surface.
  - C. Thickness: See drawings.
  - D. Size: See drawings.
  - E. Colors and Patterns: As indicated by manufacturer's designations.

#### 2.3 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 and substrate conditions indicated.
  - 1. <u>Verify adhesives have a VOC</u> content of 50 g/L or less.

## PART 3 - EXECUTION

## 3.1 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 F710.
  - 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 9 pH.
  - 4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    - b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. 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 materials are the same temperature as 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.

#### 3.2 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 at a 45-degree angle with room axis.
- 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.
  Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
- D. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- E. 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.

- F. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation 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.
- G. Adhere floor tiles to 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.

END OF SECTION 09 65 19

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#### SECTION 09 68 13 - TILE CARPETING

#### PART 1 - GENERAL

- 1.1 SUMMARY
  - A. Section Includes:1. Modular carpet tile.

#### 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. Product Data: For adhesives, indicating VOC content.
  - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For carpet tile installation, plans showing the following:
  - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
  - 2. Carpet tile type, color, and dye lot.
  - 3. Type of subfloor.
  - 4. Type of installation.
  - 5. Pattern of installation.
  - 6. Pattern type, location, and direction.
  - 7. Pile direction.
  - 8. Type, color, and location of insets and borders.
  - 9. Type, color, and location of edge, transition, and other accessory strips.
  - 10. Transition details to other flooring materials.
- D. Samples: For each exposed product and for each color and texture required.
- 1.4 INFORMATIONAL SUBMITTALS
  - A. Product test reports.
  - B. Sample warranty.
- 1.5 CLOSEOUT SUBMITTALS
  - A. Maintenance data.
- 1.6 QUALITY ASSURANCE
  - A. Installer Qualifications: Certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- 1.7 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 Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

- 2.1 CARPET TILE (CPT)
  - A. See Drawings for Basis-of-Design.
  - B. Color: As selected by Architect from manufacturer's full range.
  - C. Pattern: Match Architect's samples.
  - D. Fiber Content: 100 percent nylon 6, 6.
  - E. Fiber Type: Antron Lumena.
  - F. Pile Characteristic: Patterned Loop, Tip Shear pile.
  - G. Density: Insert 6,500 oz./cu. yd. (240.34 kg/cu. cm).
  - H. Pile Thickness: 0.128 inches (3.25 mm) for finished carpet tile according to ASTM D6859.
  - I. Stitches: 9.66 stitches per inch (38.03 per 10 cm).
  - J. Gage: 5/64 ends per inch (50.39 per 10 cm).
  - K. Total Weight: 22 oz./sq. yd. (780 g/sq. m) for finished carpet tile.
  - L. Primary Backing/Backcoating: Manufacturer's standard composite materials.
  - M. Backing System: Infinity 2 Modular .
  - N. Size: 24 by 24 inches (610 by 610 mm).
  - O. Applied Treatments:
    - 1. Soil-Resistance Treatment: Manufacturer's standard treatment.
    - 2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:
      - a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
  - P. Sustainable Design Requirements:
    - 1. Sustainable Product Certification: Gold level certification according to ANSI/NSF 140.
  - Q. Performance Characteristics:
    - 1. Appearance Retention Rating: Heavy traffic, 3.0 minimum according to ASTM D7330.
    - 2. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
    - 3. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D2646.
    - 4. Tuft Bind: Not less than 6.2 lbf (28 N) according to ASTM D1335.
    - 5. Delamination: Not less than 4 lbf/in. (0.7 N/mm) according to ASTM D3936.
    - 6. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.
    - 7. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
    - 8. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
    - 9. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC 16, Option E.
    - 10. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

#### 2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

1. Verify adhesives have a VOC content of 50 g/L or less.

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Concrete Slabs:
  - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
    - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- B. Wood Subfloors: Verify that underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

#### 3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing 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 the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.

I. 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 09 68 13

## PART 1 - GENERAL

#### 1.1 SUMMARY

## A. Section Includes:

- 1. Surface preparation and application of paint systems on the following exterior substrates:
  - a. Steel and iron.
    - b. Galvanized metal.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Sustainable Design Submittals:
  - 1. <u>Product Data</u>: For paints and coatings, indicating VOC content.
- C. Samples: For each type of topcoat product.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in the Exterior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

#### 1.3 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    - b. Other Items: Architect will designate items or areas required.
    - Final approval of color selections will be based on mockups.
      - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

#### PART 2 - PRODUCTS

2.

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Benjamin Moore & Co.
  - 2. Dulux (formerly ICI Paints); a brand of AkzoNobel.
  - 3. Dunn-Edwards Corporation.
  - 4. Kwal Paint; Comex Group.
  - 5. PPG Architectural Coatings.
  - 6. Sherwin-Williams Company (The).

Retain "Products" Paragraph below and insert lists of manufacturers and products in the Exterior Painting Schedule to require specific products or a comparable product from other manufacturers.

# 2.2 PAINT PRODUCTS

- A. MPI Standards: Provide products complying with MPI standards indicated and listed in its "MPI Approved Products List."
- B. Material Compatibility:

- 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
- 2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. <u>VOC Content</u>: For field applications, verify paints and coatings comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
  - 1. Flat Paints and Coatings: 50 g/L.
  - 2. Nonflat Paints and Coatings: 50 g/L.
  - 3. Dry-Fog Coatings: 150 g/L.
  - 4. Primers, Sealers, and Undercoaters: 100 g/L.
  - 5. Rust-Preventive Coatings: 100 g/L.
  - 6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
  - 7. Pretreatment Wash Primers: 420 g/L.
  - 8. Shellacs, Clear: 730 g/L.
  - 9. Shellacs, Pigmented: 550 g/L.
- D. Colors: As selected by Architect from manufacturer's full range.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- B. Proceed with coating application only after unsatisfactory conditions have been corrected.
  1. Application of coating indicates acceptance of surfaces and conditions.

#### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

#### 3.3 INSTALLATION

- A. Apply paints in accordance with manufacturer's written instructions and recommendations in "MPI Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

#### 3.4 CLEANING AND PROTECTION

- A. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- B. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
# 3.5 EXTERIOR PAINTING SCHEDULE

A. Steel and Iron Substrates:

1.

- Water-Based Light Industrial Coating over Epoxy System MPI EXT 5.1R:
  - a. Prime Coat: Primer, epoxy, anti-corrosive MPI #101.
  - b. Intermediate Coat: Epoxy, high build, low gloss MPI #108.
  - c. Semigloss Topcoat: Light industrial coating, exterior, water based, semigloss (MPI Gloss Level 5), MPI #163.
- B. Galvanized-Metal Substrates:
  - 1. Latex System MPI EXT 5.3H:
    - a. Water-Based Prime Coat: Primer, galvanized, water based, MPI #134.
    - b. Intermediate Coat: Latex, exterior, matching topcoat.
    - c. Semigloss Topcoat: Latex, exterior, semigloss (MPI Gloss Level 5), MPI #11.

END OF SECTION 09 91 14

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### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
  - 1. ConcretE.
  - 2. Steel and iron.
  - 3. Galvanized metal.
  - 4. Gypsum board.
  - 5. Spray-textured ceilings.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Sustainable Design Submittals:
  - 1. <u>Product Data</u>: For paints and coatings, indicating VOC content.
  - 2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for lowemitting materials.
- C. Samples: For each type of topcoat product.
- D. Product List: Use same designations indicated on Drawings and in the Interior Painting Schedule to crossreference paint systems specified in this Section. Include color designations.

#### 1.3 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    - b. Other Items: Architect will designate items or areas required.
  - 2. Final approval of color selections will be based on mockups.
    - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Behr Process Corporation.
  - 2. Benjamin Moore & Co.
  - 3. Dunn-Edwards Corporation (a Nippon Paint Holdings Co. Ltd. company).
  - 4. PPG Paints.
  - 5. Sherwin-Williams Company (The).

#### 2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."
- B. Material Compatibility:

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- 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
- 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. <u>Emissions Requirements</u>: Verify field-applied paints and coatings that are inside the weatherproofing system comply with one of the following:
  - 1. Low-Emitting Materials: Verify VOC emissions comply with the 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. Verify VOC content does not exceed limits of authorities having jurisdiction and the following:
    - a. Flat Coatings: 50 g/L.
    - b. Nonflat Coatings: 100 g/L.
    - c. Primers, Sealers, and Undercoats: 100 g/L.
    - d. Shellacs, Clear: 730 g/L.
    - e. Shellacs, Pigmented: 550 g/L.
- D. Colors: As selected by Architect from manufacturer's full range.
  - 1. Twenty percent of surface area will be painted with deep tones.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- B. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.

#### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
- C. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

#### 3.3 INSTALLATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- C. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  - 1. Paint the following work where exposed in equipment rooms:
    - a. Equipment, including panelboards and switch gear.
    - b. Uninsulated metal piping.
    - c. Metal conduit.
    - d. Tanks that do not have factory-applied final finishes.
    - e. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
  - 2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

#### 3.4 FIELD QUALITY CONTROL

- Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency Α. to inspect and test paint for dry-film thickness.
  - Contractor shall touch up and restore painted surfaces damaged by testing. 1.
  - If test results show that dry-film thickness of applied paint does not comply with paint 2. manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.

#### 3.5 CLEANING AND PROTECTION

- Α. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- Β. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

#### 3.6 INTERIOR PAINTING SCHEDULE

- Concrete Substrates (Nontrafic Surfaces): Α. 1.
  - Latex System, MPI INT 3.1E:
    - Prime Coat: Latex. interior. matching topcoat. a.
    - Intermediate Coat: Latex, interior, matching topcoat. b.
    - Topcoat: Latex, interior (MPI Gloss Level 4), MPI #43. c.
- Β. Steel Substrates:

1.

1.

1.

- Latex System, Alkyd Primer, MPI INT 5.1QQ:
  - Prime Coat: Shop primer specified in Section where substrate is specified. a.
  - b. Intermediate Coat: Latex, interior, matching topcoat.
  - C. Topcoat: Latex, interior, semigloss (MPI Gloss Level 5), MPI #54.
- Galvanized-Metal Substrates: C.
  - Latex System, MPI INT 5.3A:
    - Prime Coat: Primer, galvanized, cementitious, MPI #26. a.
    - Prime Coat: Primer, galvanized, water based, MPI #134. b.
    - Intermediate Coat: Latex, interior, matching topcoat. C.
    - d. Topcoat: Latex, interior, semigloss (MPI Gloss Level 5), MPI #54.
- Spray-Textured Ceiling Substrates: D.
  - Latex, Flat System, MPI INT 9.1A: Spray applied.
    - Prime Coat: Latex, interior, flat, matching topcoat. a.
    - Topcoat: Latex, interior, flat (MPI Gloss Level 1), MPI #53. h
- Gypsum Board and Plaster Substrates: Ε.
  - Institutional Low-Odor/VOC Latex System, MPI INT 9.2M: 1.
    - Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149. a.
    - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
    - Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146. c.

END OF SECTION 09 91 24

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# SECTION 10 14 23.16 - ROOM-IDENTIFICATION PANEL SIGNAGE

# PART 1 - GENERAL

# 1.1 SUMMARY

- A. Section includes room-identification signs that are directly attached to the building.
- B. Related Requirements:
  - 1. Section 10 14 16 "Plaques" for one-piece, solid metal signs, with or without frames, that are used for high-end room-identification.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. <u>Product Data</u>: For adhesives, indicating VOC content.
  - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For room-identification signs.
  - 1. Include fabrication and installation details and attachments to other work.
  - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
  - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- D. Samples: For each exposed product and for each color and texture specified.

# 1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.
- 1.4 CLOSEOUT SUBMITTALS
  - A. Maintenance data.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs 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 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design," the ABA standards of the Federal agency having jurisdiction and ICC A117.1 Insert requirement.

#### 2.2 ROOM-IDENTIFICATION SIGNS

- A. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
  - 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. Ádvance Corporation.
    - b. ASI Sign Systems, Inc.
    - c. Best Sign Systems, Inc.
    - d. Clarke Systems.

- e. Inpro Corporation.
- 2. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated to acrylic or phenolic backing sheet to produce composite sheet.
  - a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.
  - b. Surface-Applied Graphics: Applied vinyl film.
  - c. Subsurface Graphics: Reverse etch image.
  - d. Color(s): As selected by Architect from manufacturer's full range.
- 3. Sign-Panel Perimeter: Finish edges smooth.
  - a. Edge Condition: Square cut.
  - b. Corner Condition in Elevation: Square.
- 4. Mounting: Manufacturer's standard method for substrates indicated with.

# 2.3 SIGN MATERIALS

- A. Acrylic Sheet: ASTM D4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- B. Vinyl Film: UV-resistant vinyl film with pressure-sensitive, permanent adhesive; die cut to form characters or images as indicated on Drawings and suitable for exterior applications.

# 2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, 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 or hot-dip galvanized unless otherwise indicated.
  - 3. Exposed Metal-Fastener Components, General:
    - a. Fabricated from same basic metal and finish of fastened sign unless otherwise indicated.
  - 4. Sign Mounting Fasteners:
    - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly unless otherwise indicated.
    - b. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, and installed in predrilled holes.
- B. Adhesive: As recommended by sign manufacturer.
  - 1. <u>Verify adhesives have a VOC</u> content of 70 g/L or less.
- C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

#### 2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  - 1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
  - 2. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
  - 3. Provide rabbets, lugs, and tabs 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.
- B. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.
- C. Subsurface-Etched Graphics: Reverse etch back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

# PART 3 - EXECUTION

#### 3.1 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. 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.
- 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. 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.
  - 3. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of 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.
  - 4. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

END OF SECTION 10 14 23.16

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# PART 1 - GENERAL

#### 1.1 SUMMARY

#### Α. Section Includes:

- Public-use washroom accessories. 1
- 2. Underlavatory guards.
- Custodial accessories. 3.

#### 1.2 ACTION SUBMITTALS

- Α. Product Data: For each type of product.
- Β. Samples: For each exposed product and for each finish specified, full size. Approved full-size Samples will be returned and may be used in the Work. 1.

#### 1.3 INFORMATIONAL SUBMITTALS

- Α. Sample warranties.
- 1.4 CLOSEOUT SUBMITTALS
  - Α. Maintenance data.

#### WARRANTY 1.5

- Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in Α. materials or workmanship within specified warranty period. 1.
  - Warranty Period: 10 years from date of Substantial Completion.
- Β. Manufacturer's Special Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers 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 PERFORMANCE REQUIREMENTS

- Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a Α. qualified testing agency, and marked for intended location and application.
- B. Structural Performance: Design accessories and fasteners to comply with the following requirements: Grab Bars: Installed units are able to resist 250 lbf (1112 N) concentrated load applied in any 1 direction and at any point.

#### 2.2 PUBLIC-USE WASHROOM ACCESSORIES

- Α. Toilet Tissue (Roll) Dispenser: (TP)
  - Basis-of-Design: B-2888 Surface-Mounted Multi-Roll Toilet Tissue Dispenser by Bobrick 1.
  - Description: Double-roll dispenser. 2.
  - Mounting: Surface mounted. 3.
  - Operation: Noncontrol delivery with theft-resistant spindle. 4.
  - Capacity: Designed for 5-inch- (127-mm-) diameter tissue rolls. 5.
  - Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin). 6.
- Automatic Soap Dispenser: (SD) Β.
  - Basis-of-Design: B-2013 Automatic Wall-Mounted Foam Soap Dispenser by Bobrick 1.
  - 2. Description: Automatic dispenser with infrared sensor to detect presence of hands; battery powered; designed for dispensing soap in lather form.
  - 3. Mounting: Surface mounted.
  - Capacity: 800 ml (27-fl.oz.). 4.

- 5. Materials: Type 304 Stainless Steel with Satin finish.
- 6. Refill Indicator: LED indicator.
- 7. Low-Battery Indicator: LED indicator.
- C. Grab Bar: (GB)
  - 1. Mounting: Flanges with concealed fasteners.
  - 2. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
    - a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).
  - 3. Outside Diameter: 1-1/2 inches (38 mm).
  - 4. Configuration and Length: As indicated on Drawings.
- D. Sanitary-Napkin Disposal Unit: (ND)
  - 1. Mounting: Surface mounted.
  - 2. Door or Cover: Self-closing, disposal-opening cover.
  - 3. Receptacle: Removable.
  - 4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- E. Mirror Unit: (MIRR)
  - 1. Frame: Stainless steel angle, 0.05 inch (1.3 mm) thick.
  - a. Corners: Manufacturer's standard.
  - 2. Size: 24 by 36 inches high.
  - 3. Hangers: Manufacturer's standard rigid, tamper and theft resistant.

# F. Hook:

- 1. Provide 3 hooks in each restroom. Coordinate location with Owner.
- 2. Description: Double-prong unit.
- 3. Mounting: Concealed.
- 4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

# 2.3 UNDERLAVATORY GUARDS

- A. Underlavatory Guard:
  - 1. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
  - 2. Material and Finish: Antimicrobial, molded plastic, white.

# 2.4 CUSTODIAL ACCESSORIES

- A. Custodial Mop and Broom Holder:
  - 1. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
  - 2. Length: 36 inches (914 mm).
  - 3. Hooks: Four.
  - 4. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
  - 5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
    - a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.
      - b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel.

#### 2.5 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

# 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.
  - 1. Remove temporary labels and protective coatings.
- B. Grab Bars: Install to comply with specified structural-performance requirements.

END OF SECTION 10 28 00

# SECTION 10 44 13 - FIRE PROTECTION CABINETS

# PART 1 - GENERAL

- 1.1 SUMMARY
  - A. Section Includes:1. Fire-protection cabinets for portable fire extinguishers.
- 1.2 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
  - B. Shop Drawings: For fire-protection cabinets.
  - C. Samples: For each type of exposed finish required.
- 1.3 CLOSEOUT SUBMITTALS
  - A. Maintenance data.
- 1.4 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 PERFORMANCE REQUIREMENTS
  - A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.
- 2.2 FIRE-PROTECTION CABINET
  - A. Cabinet Type: Suitable for fire extinguisher.
  - B. Cabinet Construction: Nonrated or One-hour fire rated. See plan for location in rated walls.
    - 1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch-(1.09-mm-) thick cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick fire-barrier material. Provide factory-drilled mounting holes.
  - C. Cabinet Material: Cold-rolled steel sheet.
  - D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
     1. Rolled-Edge Trim: 2-1/2-inch (64-mm) backbend depth.
  - E. Cabinet Trim Material: Same material and finish as door.
  - F. Door Material: Steel sheet.
  - G. Door Style: Fully glazed panel with frame.
  - H. Door Glazing: Tempered float glass (clear).
  - I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

J. Accessories:

FACILITIES SHOP SPANISH FORK CITY

- 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fireprotection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
- 2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
- 3. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
- 4. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
- 5. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
  - Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
    - 1) Location: Applied to cabinet glazing.
    - 2) Application Process: Pressure-sensitive vinyl letters.
    - 3) Lettering Color: Red.
    - 4) Orientation: Vertical.

#### K. Materials:

a.

- 1. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.
  - a. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.
    b. Color: As selected by Architect from manufacturer's full range.
- Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

# 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.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.
- B. Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply vinyl lettering at locations indicated.
- E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION 10 44 13

# SECTION 10 44 16 - FIRE EXTINGUISHERS

# PART 1 - GENERAL

- 1.1 SUMMARY
  - A. Section includes portable, hand-carried fire extinguishers.
- 1.2 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
- 1.3 INFORMATIONAL SUBMITTALS
  - A. Warranty: Sample of special warranty.
- 1.4 CLOSEOUT SUBMITTALS
  - A. Operation and maintenance data.
- 1.5 COORDINATION
  - A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

#### 1.6 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. 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.

#### 2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- 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. JL Industries, Inc.; a division of the Activar Construction Products Group.
  - 2. Kidde Residential and Commercial Division.
  - 3. Larsens Manufacturing Company.
  - 4. Potter Roemer LLC.
- B. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet indicated.
  - 1. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.
- C. Regular Dry-Chemical Type: UL-rated 2-A, 10-B-C, 7.5 lb. nominal capacity, with sodium bicarbonatebased dry chemical in manufacturer's standard enameled container.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 10 44 16

## SECTION 12 36 23.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

# PART 1 - GENERAL

- 1.1 SUMMARY
  - A. Section Includes:1. Plastic-laminate-clad countertops.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. <u>Product Data</u>: For recycled content, indicating postconsumer and preconsumer recycled content.
  - 2. <u>Product Data</u>: For adhesives, indicating that product contains no urea formaldehyde.
  - 3. <u>Product Data</u>: For installation adhesives, indicating VOC content.
  - 4. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.
  - 5. <u>Product Data</u>: For composite wood products, indicating that product contains no urea formaldehyde.
- C. Shop Drawings: For plastic-laminate-clad countertops.
- D. Samples: Plastic laminates in each type, color, pattern, and surface finish required.

# 1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For the following:
  - 1. Composite wood products.
  - 2. High-pressure decorative laminate.
  - 3. Adhesives.

#### 1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

## 1.5 FIELD CONDITIONS

- A. Environmental Limitations without Humidity Control: Do not deliver or install wood countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Environmental Limitations with Humidity Control: Do not deliver or install wood countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 20 and 50 percent during the remainder of the construction period.

#### PART 2 - PRODUCTS

#### 2.1 PLASTIC-LAMINATE-CLAD COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGL.

- 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. Formica Corporation.
  - b. Lamin-Art, Inc.
  - a. Nevamar; a Panolam Industries International, Inc. brand.
  - b. Wilsonart LLC.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. As indicated by manufacturer's designations.
  - 2. Match Architect's sample.
  - 3. As selected by Architect from manufacturer's full range in the following categories:
    - a. Wood grains, matte finish with grain running parallel to length of countertop.
    - b. Patterns, matte finish.
- E. Edge Treatment: 3.0-mm PVC edging.
- F. Core Material: MDF, MDF made with exterior glue or Exterior-grade plywood.
- G. Core Thickness: 3/4 inch (19 mm).
  - 1. Build up countertop thickness to 1-1/2 inches (38 mm) at front, back, and ends with additional layers of core material laminated to top.
- H. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.
- I. Paper Backing: Provide paper backing on underside of countertop substrate.

# 2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.
  - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of countertop and quality grade specified unless otherwise indicated.
  - 1. <u>Composite Wood Products</u>: Verify products are made without added urea formaldehyde.
  - <u>Recycled Content of MDF and Particleboard</u>: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 75 percent.
  - 3. MDF: Medium-density fiberboard, ANSI A208.2, Grade 130.
  - 4. Softwood Plywood: DOC PS 1.

# 2.3 ACCESSORIES

- A. Wire-Management Grommets: Circular, molded-plastic grommets and matching plastic caps with slot for wire passage.
  - 1. Outside Diameter: 2 inches (51 mm).
  - 2. Color: Black,

#### 2.4 MISCELLANEOUS MATERIALS

- A. <u>Adhesives</u>: Do not use adhesives that contain urea formaldehyde.
- B. Adhesive for Bonding Plastic Laminate: As selected by fabricator to comply with requirements.
   1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
- C. Installation Adhesive:
  - 1. <u>Verify adhesives have a VOC</u> content of 70 g/L or less.

# 2.5 FABRICATION

- A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch (25 mm) over base cabinets. Ease edges to radius indicated for the following:
  - 1. Solid-Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.
- B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
  - 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
  - 2. Seal edges of cutouts by saturating with varnish.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
  - 1. Secure field joints in countertops with concealed clamping devices located within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten in accordance with manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
  - 1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches (3-mm-in-2400-mm) variation from a straight, level plane.
  - 2. Secure backsplashes to walls with adhesive.
  - 3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.
- F. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches (1220 mm) o.c. Remove protection at Substantial Completion.

END OF SECTION 12 36 23.13

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# SECTION 12 36 61.16 - SOLID SURFACING COUNTERTOPS

## PART 1 - GENERAL

#### 1.1 SUMMARY

# A. Section Includes:

- 1. Solid surface material countertops.
- 2. Solid surface material end splashes.
- 3. Solid surface material apron fronts.

# 1.2 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Sustainable Design Submittals:
  - 1. <u>Product Data</u>: For adhesives, indicating VOC content.
  - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
  - 3. <u>Product Data</u>: For composite wood products, indicating that product contains no urea formaldehyde.
- C. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
- D. Samples: For each type of material exposed to view.

# PART 2 - PRODUCTS

# 2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
  - 1. 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. Avonite Surfaces
    - b. Formica Corporation
    - c. LG Chemical, Ltd.
    - d. Samsung Chemical USA, Inc.
    - e. Wilsonart, LLC
  - 2. Type: Provide Standard type unless Special Purpose type is indicated.
  - 3. Colors and Patterns: As selected by Architect from manufacturer's full range.
- B. <u>Composite Wood Products</u>: Verify products are made without added urea formaldehyde.
- C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

# 2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
   1. Grade: Custom.
- B. Configuration:
  - 1. Front: Straight, slightly eased at top with separate apron, 6 inches (150 mm) high, recessed 1/4inch (6.4-mm) behind front edge.
  - 2. End Splash: Matching Countertop.
- C. Countertops: 3/4-inch- (19-mm-) thick, solid surface material with front edge built up with same material.
- D. Joints: Fabricate countertops without joints.

- E. Cutouts and Holes:
  - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

# 2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
  - 1. <u>Verify adhesives have a VOC</u> content of 70 g/L or less.
- B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer.
- B. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions.
- C. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
- D. Install end splashes by adhering to wall and countertops with adhesive.
- E. Install aprons to backing and countertops with adhesive.
- F. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- G. Apply sealant to gaps at walls; comply with Section 07 92 00 "Joint Sealants."

END OF SECTION 12 36 61.16

#### SECTION 13 34 19 - METAL BUILDING SYSTEMS

## PART 1 - GENERAL

## 1.1 SUMMARY

# A. Section Includes:

- 1. Structural-steel framing.
- 2. Metal roof panels.
- 3. Metal wall panels.
- 4. Metal soffit panels.
- 5. Accessories.

# 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

# 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of metal building system component.
- B. Sustainable Design Submittals:
  - 1. <u>Product Test Reports</u>: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirements.
  - 2. <u>Product Data</u>: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
- C. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and attachments to other work.
- D. Samples: For units with factory-applied finishes.
- E. Delegated Design Submittals: For metal building systems.
  - 1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
  - 1. Name and location of Project.
  - 2. Order number.
  - 3. Name of manufacturer.
  - 4. Name of Contractor.
  - 5. Building dimensions including width, length, height, and roof slope.
  - 6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
  - 7. Governing building code and year of edition.
  - 8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
  - 9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
  - 10. Building-Use Category: Indicate category of building use and its effect on load importance factors.
- C. Material test reports.
- D. Source quality-control reports.
- E. Field quality-control reports.

F. Sample warranties.

# 1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

## 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer.
  - 1. Accreditation: Manufacturer's facility accredited according to IAS AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
  - 2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.
- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- 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, "Structural Welding Code Sheet Steel."

# 1.7 WARRANTY

- A. Special Warranty on Metal Panel Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Finish Warranty Period: 20 years from date of Substantial Completion.
- B. Special Weathertightness Warranty for Metal Roof Panels: Manufacturer agrees to repair or replace metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.
  - 1. Warranty Period: 20 years from date of Substantial Completion.

#### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design metal building system.
- B. Structural Performance: Metal building systems to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."
  - 1. Design Loads: As indicated on Drawings.
  - 2. Deflection and Drift Limits:
    - Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."
    - b. No greater than the following:
      - 1) Purlins and Rafters: Vertical deflection of 1/180 of the span.
      - 2) Girts: Horizontal deflection of 1/180 of the span.
      - 3) Metal Roof Panels: Vertical deflection of 1/60 of the span.
      - 4) Metal Wall Panels: Horizontal deflection of 1/60 of the span.
      - 5) Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
      - 6) Lateral Drift: Maximum of 1/60 of the building height.
- C. Seismic Performance: Metal building system to withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

- E. Structural Performance for Metal Roof and Wall Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
   1. Wind Loads: As indicated on Drawings.
- F. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:
   1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- G. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E283 at the following test-pressure difference:
   1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- H. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E1646 or ASTM E331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- I. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- J. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-upliftresistance class indicated.
  - 1. Uplift Rating: UL 90.
- K. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
   1. Fire/Windstorm Classification: Class 1A- 120.
- L. <u>Solar Reflectance Index (SRI)</u>: Three-year-aged SRI not less than 64 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- M. Energy Star Listing: Roof panels that are listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- N. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
  - 1. Three-year, aged, Solar Reflectance Index of not less than 64 when calculated according to ASTM E1980.
- O. Thermal Performance for Opaque Elements: Provide the following maximum U-factors and minimum Rvalues when tested according to ASTM C1363 or ASTM C518:
  - 1. Roof:
    - a. R-Value: 38.
  - 2. Walls:
    - a. R-Value: 33.
- 2.2 STRUCTURAL-STEEL FRAMING
  - A. <u>Recycled Content of Steel Products</u>: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
  - B. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."
  - C. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
  - D. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
  - E. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafters and rake beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
    - 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.

- a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.
- 2. Frame Configuration: Single gable.
- 3. Exterior Column: Uniform depth or Tapered.
- 4. Rafter: Uniform depth or Tapered.
- F. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
- G. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:
- H. Anchor Rods: Headed anchor rods as indicated in Anchor Rod Plan for attachment of metal building to foundation.

# 2.3 METAL ROOF PANELS

- A. Standing-Seam, Vertical-Rib, Metal Roof Panels: Formed with interlocking ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.
  - 1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, with an 0.024-inch (0.61-mm) nominal uncoated steel thickness on the exterior face and an 0.018-inch (0.46 mm) nominal uncoated steel thickness on the interior face. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
    - a. Exterior Finish: Three-coat fluoropolymer.
    - b. Color: As selected by Architect from manufacturer's full range.
  - 2. Clips: Two-piece floating to accommodate thermal movement.
  - 3. Joint Type: Panels snapped together.
  - 4. Panel Coverage: 24 inches (610 mm).
  - 5. Panel Height: 4 inches (102 mm).
  - 6. Basis of Design: CFR Insulated Roof Panel by Metl Span, a Nucor Company.

#### 2.4 METAL WALL PANELS

- A. Exposed-Fastener, Tapered-Rib, Metal Wall Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
  - 1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, with an 0.024-inch (0.61-mm) nominal uncoated steel thickness on the exterior face and an 0.018-inch (0.46 mm) nominal uncoated steel thickness on the interior face. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
    - a. Exterior Finish: Three-coat fluoropolymer.
    - b. Color: As selected by Architect from manufacturer's full range.
  - 2. Major-Rib Spacing: 12 inches (305 mm) o.c.
  - 3. Panel Coverage: 36 inches (914 mm).
  - 4. Panel Height: 4.0 inch (102 mm).
  - 5. Basis of Design: LS-36 Insulated Roof and Wall Panel by Metl Span, a Nucor Company.

## 2.5 METAL SOFFIT PANELS

- A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
- B. Metal Soffit Panels: Match profile and material of metal wall panels.
  - 1. Finish: Match finish and color of metal roof panels.

# 2.6 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
  - 1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
- B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
- D. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.
- E. Gutters: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2438-mm-) long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
  - 1. Gutter Supports: Fabricated from same material and finish as gutters.
  - 2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.
- F. Downspouts: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot- (3-m-) long sections, complete with formed elbows and offsets.
   1. Mounting Straps: Fabricated from same material and finish as gutters.
- G. Roof Curbs: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.048-inch (1.21-mm) nominal uncoated steel thickness prepainted with coil coating; finished to match metal roof panels; with welded top box and bottom skirt, and integral full-length cricket; capable of withstanding loads of size and height indicated.
- H. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

# 2.7 FABRICATION

- A. General: Design components and field connections required for erection to permit easy assembly.
  - 1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
  - 2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members to be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
- C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
- D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
- E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
  - 1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

# 2.8 SOURCE QUALITY CONTROL

- A. Special Inspection: Owner will engage a qualified special inspector to perform source quality control inspections and to submit reports.
  - 1. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.
- B. Product will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

# PART 3 - EXECUTION

## 3.1 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written instructions and drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base and Bearing 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. 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.
  - 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. 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 will be completed and in service.
- F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
  - 1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.
    - a. Joint Type: Snug tightened or pretensioned as required by manufacturer.
- G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
  - 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
  - 2. Locate and space wall girts to suit openings such as doors and windows.
  - 3. Provide supplemental framing at entire perimeter of openings, including doors, windows, ventilators, and other penetrations of roof and walls.
- H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
  - 1. Tighten rod and cable bracing to avoid sag.
  - 2. Locate interior end-bay bracing only where indicated.
- I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

# 3.2 METAL PANEL INSTALLATION, GENERAL

1.

- A. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
    - a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
  - 2. Install metal panels perpendicular to structural supports unless otherwise indicated.
  - 3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
  - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
  - 5. Locate metal panel splices over structural supports with end laps in alignment.
  - 6. Lap metal flashing over metal panels to allow moisture to run over and off the material.
- B. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
  - 1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberizedasphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.
  - 1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
  - 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."

# 3.3 METAL ROOF PANEL INSTALLATION

- A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
  - 1. Install ridge caps as metal roof panel work proceeds.
  - 2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with selftapping screws.
- B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.
  - 1. Install clips to supports with self-drilling or self-tapping fasteners.
  - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  - 3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
  - 4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
  - 5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction. Predrill panels for fasteners.
  - 6. Provide metal closures at peaks, rake edges, rake walls, and each side of ridge caps.
- C. Lap-Seam Metal Roof Panels: Fasten metal roof panels to supports with exposed fasteners at each lapped joint, at location and spacing recommended by manufacturer.
  - 1. Provide metal-backed sealing washers under heads of exposed fasteners bearing on weather side of metal roof panels.
  - 2. Provide sealant tape at lapped joints of metal roof panels and between panels and protruding equipment, vents, and accessories.
  - 3. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps and on side laps of nesting-type metal panels, on side laps of ribbed or fluted metal panels, and elsewhere as needed to make metal panels weatherproof to driving rains.
  - 4. At metal panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with butylrubber sealant and fastened together by interlocking clamping plates.

D. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or selftapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

# 3.4 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
  - 2. Shim or otherwise plumb substrates receiving metal wall panels.
  - 3. When two rows of metal panels are required, lap panels 4 inches (102 mm) minimum.
  - 4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
  - 5. Rigidly fasten base end of metal wall panels and allow eave end free movement for thermal expansion and contraction. Predrill panels.
  - 6. Flash and seal metal wall panels with weather closures at eaves and rakes, and at perimeter of all openings. Fasten with self-tapping screws.
  - 7. Install screw fasteners in predrilled holes.
  - 8. Install flashing and trim as metal wall panel work proceeds.
  - 9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated on Drawings; if not indicated, as necessary for waterproofing.
  - 10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
  - 11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

# 3.5 METAL SOFFIT PANEL INSTALLATION

- A. Provide metal soffit panels the full width of soffits. Install panels perpendicular to support framing.
- B. Flash and seal metal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

## 3.6 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
  - 1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  - 2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  - 3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
  - 1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
  - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

- C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- D. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) o.c. in between.
  - 1. Provide elbows at base of downspouts to direct water away from building.
  - 2. Tie downspouts to underground drainage system indicated.
- E. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.
- 3.7 FIELD QUALITY CONTROL
  - A. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports.
  - B. Product will be considered defective if it does not pass tests and inspections.
  - C. Prepare test and inspection reports.

END OF SECTION 13 34 19

# SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

- 1.1 SUMMARY
  - A. Section Includes:
    - 1. Excavating and backfilling for buildings and structures.
    - 2. Drainage course for concrete slabs-on-grade.

#### 1.2 DEFINITIONS

- A. Backfill: Soil material used to fill an excavation.
  - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
  - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- J. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.
- 1.3 PREINSTALLATION MEETINGS
  - A. Preinstallation Conference: Conduct preexcavation conference at Project site.
- 1.4 INFORMATIONAL SUBMITTALS
  - A. Material test reports.
- 1.5 FIELD CONDITIONS
  - A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth-moving operations.

FACILITIES SHOP SPANISH FORK CITY B. Do not commence earth-moving operations until plant-protection measures specified in Section 01 56 39 "Temporary Tree and Plant Protection" are in place.

## PART 2 - PRODUCTS

#### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487, or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487, or a combination of these groups.
  - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- E. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- F. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- G. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and zero to 5 percent passing a No. 8 (2.36-mm) sieve.

#### 2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.
- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored to comply with local practice or requirements of authorities having jurisdiction.

## PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

# 3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

#### 3.3 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

# 3.4 SUBGRADE INSPECTION

- A. Proof-roll subgrade below the building slabs with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

# 3.5 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.
  - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

# 3.6 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

#### 3.7 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  - 1. Under building slabs, use engineered fill.
  - 2. Under footings and foundations, use engineered fill.

#### 3.8 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

# 3.9 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment and not more than 6 inches (150 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D1557:
  - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.

## 3.10 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.
- 3.11 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE
  - A. Place drainage course on subgrades free of mud, frost, snow, or ice.
  - B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
    - 1. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
    - 2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D698.

#### 3.12 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform inspections:
- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

#### 3.13 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

# 3.14 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 20 00
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