# FAIRVIEW CAMPUS New Middle School and High School

Tony Marchio Drive Townsend, DE 19734

## BID PAC 'E'



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#### SECTION 033000 - CAST-IN-PLACE CONCRETE

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Footings.
  - 2. Foundation walls.
  - 3. Slabs-on-grade.
  - 4. Suspended slabs.
- B. Related Sections include the following:
  - 1. Division 2 Section "Earthwork" for drainage fill under slabs-on-grade.
  - 2. Division 2 Section "Cement Concrete Pavement" for concrete pavement and walks.
  - 3. Division 2 Section "Decorative Cement Concrete Pavement" for decorative concrete pavement and walks.

#### 1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.

- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Samples: For waterstops and vapor retarder.
- E. Welding certificates.
- F. Qualification Data: For Installer, manufacturer, testing agency.
- G. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
  - 1. Aggregates.
- H. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Cementitious materials.
  - 2. Admixtures.
  - 3. Form materials and form-release agents.
  - 4. Steel reinforcement and accessories.
  - 5. Waterstops.
  - 6. Curing compounds.
  - 7. Floor and slab treatments.
  - 8. Bonding agents.
  - 9. Adhesives.
  - 10. Vapor retarders.
  - 11. Semirigid joint filler.
  - 12. Joint-filler strips.
  - 13. Repair materials.
- I. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.
- J. Field quality-control test reports.
- K. Minutes of preinstallation conference.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. 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."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
  - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
  - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician -Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specification for Structural Concrete,"
  - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
  - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Concrete subcontractor.
  - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, [curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, vapor-retarder installation, steel reinforcement installation, floor and slab flatness and levelness measurement, and concrete protection.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

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

#### 2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  - 1. Plywood, metal, or other approved panel materials.
  - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
    - a. High-density overlay, Class 1 or better.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
  - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

- 1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
- 2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
- 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

#### 2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, assembled with clips.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

#### 2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut bars true to length with ends square and free of burrs.
- 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 according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

## 2.5 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. Portland Cement: ASTM C 150, Type I/II, gray. Supplement with the following:
    - a. Fly Ash: ASTM C 618, Class C.
    - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
  - 1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.

- 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Water: ASTM C 94/C 94M and potable.

#### 2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will 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. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 4. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C. Provide at exterior concrete slabs.
  - 1. Products:
    - a. Boral Material Technologies, Inc.; Boral BCN.
    - b. Euclid Chemical Company (The); Eucon CIA.
    - c. Grace Construction Products, W. R. Grace & Co.; DCI.
    - d. Master Builders, Inc.; Rheocrete CNI.
    - e. Sika Corporation; Sika CNI.
- D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-setaccelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete. Provide at exterior concrete slabs.
  - 1. Products:
    - a. Axim Concrete Technologies; Catexol 1000CI.
    - b. Boral Material Technologies, Inc.; Boral BCN2.
    - c. Grace Construction Products, W. R. Grace & Co.; DCI-S.
    - d. Master Builders, Inc.; Rheocrete 222+.
    - e. Sika Corporation; FerroGard-901.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
  - 1. Manufacturers:

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- a. Bayer Corporation.
- b. ChemMasters.
- c. Conspec Marketing & Manufacturing Co., Inc.; a Dayton Superior Company.
- d. Davis Colors.
- e. Elementis Pigments, Inc.
- f. Hoover Color Corporation.
- g. Lambert Corporation.
- h. Scofield, L. M. Company.
- i. Solomon Colors.
- 2. Color: As selected by Architect from manufacturer's full range.

## 2.7 WATERSTOPS

- A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).
  - 1. Products:
    - a. Colloid Environmental Technologies Company; Volclay Waterstop-RX.
    - b. Approved equal

## 2.8 VAPOR RETARDERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class C, or polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.
  - 1. Products:
    - a. Fortifiber Corporation; Moistop Plus.
    - b. Raven Industries Inc.; Dura Skrim 8.
    - c. Reef Industries, Inc.; Griffolyn Type-85.
    - d. Stego Industries, LLC; Stego Wrap, 10 mils.
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

## 2.9 FLOOR AND SLAB TREATMENTS

A. Penetrating Liquid Floor Treatment: Provide at all exposed concrete surfaces to be treated to harden, seal and densify exposed concrete. Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

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- 1. Products:
  - a. Dayton Superior Corporation; Day-Chem Sure Hard.
  - b. Euclid Chemical Company (The); Euco Diamond Hard.
  - c. L&M Construction Chemicals, Inc.; Seal Hard.
  - d. Meadows, W. R., Inc.; Liqui-Hard.
- B. Stained Hardener with matching cure/sealer Pigmented Mineral Dry-Shake Floor Hardener: Factory-packaged, dry combination of portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides interground with cement. Placing of hardener is followed by manufacturer's recommended water membrane-forming cure and seal: ASTM C 309
  - 1. Products:
    - a. L&M Construction Chemicals, Inc.; Quartz Plate FF Hardener followed by Dress & Seal WB 30 per manufacturer's recommendations and specifications.
    - b. Scofield, L. M. Company; Lithochrome Color Hardener followed by Lithochrome Colorwax in matching color per manufacturer's recommendations and specifications.

## 2.10 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
  - 1. Products:
    - a. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
    - b. Dayton Superior Corporation; Sure Film.
    - c. Euclid Chemical Company (The); Eucobar.
    - d. L&M Construction Chemicals, Inc.; E-Con.
    - e. Meadows, W. R., Inc.; Sealtight Evapre.
    - f. Sika Corporation, Inc.; SikaFilm.
- B. 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.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
  - 1. Products:
    - a. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
    - b. Euclid Chemical Company (The); Kurez DR VOX.
    - c. L&M Construction Chemicals, Inc.; L&M Cure R.

- d. Meadows, W. R., Inc.; 1100 Clear.
- e. Tamms Industries, Inc.; Horncure WB 30.

#### 2.11 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.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Reglets: Fabricate reglets of not less than 0.0217-inch- (0.55-mm-) thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- D. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

#### 2.12 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
  - 4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
  - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

#### 2.13 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.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  - 1. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
  - 2. Silica Fume: 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement at exterior conditions and 0.30 percent by weight of cement at interior conditions.
- D. 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 water-cementitious materials ratio below 0.50.
  - 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
- E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup. Coordinate color and location with Architect.

## 2.14 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  - 2. Maximum Water-Cementitious Materials Ratio: 0.50.
  - 3. Slump Limit: 3 inch minimum and 5 inch maximum (at point of concrete placement), plus or minus 1 inch (25 mm).
  - 4. Exposure Class: F2, S0, C1, P0
- B. Foundation Walls: Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  - 2. Maximum Water-Cementitious Materials Ratio: 0.50.
  - 3. Slump Limit: 3 inch minimum and 5 inch maximum (at point of concrete placement), plus or minus 1 inch (25 mm).

- 4. Exposure Class: F2, S0, C1, P0
- C. Slabs-on-Grade Interior: Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  - 2. Minimum Cementitious Materials Content: 520 lb/cu. yd. (309 kg/cu. m).
  - 3. Slump Limit: 3 inch minimum and 5 inch maximum (at point of concrete placement), plus or minus 1 inch (25 mm).
  - 4. Exposure Class: F2, So, C1, P0
- D. Slabs-on-Grade Exterior (Exposed to Exterior Conditions): Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 4500 psi (31 MPa) at 28 days.
  - 2. Minimum Cementitious Materials Content: 520 lb/cu. yd. (309 kg/cu. m).
  - 3. Slump Limit: 3 inch minimum and 5 inch maximum (at point of concrete placement), plus or minus 1 inch (25 mm).
  - 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.
  - 5. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.
  - 6. Exposure Class: F2, S0, C2, P0
- E. Suspended Slabs: Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 3500 psi (24.1 MPa) at 28 days.
  - 2. Minimum Cementitious Materials Content: 470 lb/cu. yd. (309 kg/cu. m).
  - 3. Slump Limit: 3 inch minimum and 5 inch maximum (at point of concrete placement), plus or minus 1 inch (25 mm). For pumpable concrete, slumps may be increased by 3 inches.
  - 4. Exposure Class: F0, S0, C0, P0

## 2.15 FABRICATING REINFORCEMENT

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

#### 2.16 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
  - 1. 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.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

- 1. 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 5 minutes after ingredients are in mixer, before any part of batch is released.
- 2. 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).
- 3. 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 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
  - 1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
  - 2. Class C, 1/2 inch (13 mm) for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 1. Install keyways, reglets, recesses, and the like, for easy removal.
  - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

## 3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  - 2. 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.
  - 3. Install dovetail anchor slots in concrete structures as indicated.

## 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
  - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
  - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

#### 3.4 SHORES AND RESHORES

- A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and reshoring.
  - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

#### 3.5 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
- B. Bituminous Vapor Retarders: Place, protect, and repair vapor retarders according to manufacturer's written instructions.
- C. Granular Course: Cover vapor retarder with granular fill, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch (0 mm) or minus 3/4 inch (19 mm).

#### 3.6 STEEL REINFORCEMENT

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

laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

#### 3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
  - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  - 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  - 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- 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.
  - 2. 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 will 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.
  - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
  - 2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.

- 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

## 3.8 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

## 3.9 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 2. Maintain reinforcement in position on chairs during concrete placement.
  - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 4. Slope surfaces uniformly to drains where required.
  - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
  - 1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

## 3.10 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 be covered with a coating or covering material applied directly to concrete.

C. 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.

## 3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in 1 direction.
  - 1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
  - 1. Apply float finish to surfaces indicated to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply a trowel finish to surfaces indicated, exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
  - 2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface and per ACI 117 "Specification For Tolerances For Concrete Construction & Materials":
    - a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20 as a minimum. Coordinate and specify minimum F(F) and F(L) values with flooring manufacturer during concrete pre-installation conference. Note: Flooring manufacturer may require very flat surface classification (F(F) 45; F(L) 35) or super flat surface classification (F(F) 60; F(L) 40). Coordinate locations and requirements prior to installation.
    - b. Provide maximum floor variation of 1/8" in 10' and 1/16" in 1' for terrazzo floor tile area or requirement as indicated by product manufacturer, whichever is more stringent.

- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
  - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

#### 3.12 MISCELLANEOUS CONCRETE ITEMS

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

## 3.13 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (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 the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. 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 with the following materials:
  - a. Water.
  - b. Continuous water-fog spray.
  - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
- 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.
  - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
  - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
  - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..
- 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
- 4. 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.

## 3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  - 1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

#### 3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  - 2. After concrete has cured at least 14 days, correct high areas by grinding.
  - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

- 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
- 6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- 7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

#### 3.16 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
  - 1. Steel reinforcement placement.
  - 2. Steel reinforcement welding.
  - 3. Headed bolts and studs.
  - 4. Verification of use of required design mixture.
  - 5. Concrete placement, including conveying and depositing.
  - 6. Curing procedures and maintenance of curing temperature.
  - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

- 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
- 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
  - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
- 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
- 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
- 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
- 6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
- 7. Compression Test Specimens: ASTM C 31/C 31M.
  - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
  - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
- 8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
  - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
  - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
- 9. When strength of field-cured cylinders is less than 85 percent of companion laboratorycured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- 10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- 11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive

strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

- 12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- 13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
- 14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 15. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing. Values to be documented and provided to Architect and Flooring Manufacturer prior to placing flooring.

END OF SECTION 033000

## SECTION 04 2000 UNIT MASONRY

#### PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Concrete Block.
  - B. Split-face concrete block.
  - C. Ground-face concrete block.
  - D. Clay Facing Brick.
  - E. Mortar and Grout.
  - F. Reinforcement and Anchorage.
  - G. Lintels.
  - H. Accessories.

#### 1.02 RELATED REQUIREMENTS

- A. Division 1 Administrative Requirements: Preconstruction meeting.
- B. Division 1 Quality Requirements: The Owner will engage an Independent Testing and Inspection Agency to verify the adequacy of the Contractor's quality control.
  - 1. Before concealing the work behind the brick veneer, obtain the required inspection from a representative of the Owner's independent testing and inspection agency.
- C. Division 1 Quality Requirements: Mock-up:
  - 1. Construct mock-ups where indicated on the drawings, incorporating all components specified for the location.
  - 2. Demolish mock-up when directed by Architect, and remove debris from the site.
- D. Section 047200 Cast Stone Fabrications
- E. Section 05 5000 Metal Fabrications: Loose steel lintels.
- F. Section 07 1113 Bituminous Dampproofing: Dampproofing masonry surfaces.
- G. Section 07 2100 Thermal Insulation: Insulation for cavity spaces.
- H. Section 07 6200 Sheet Metal Flashing and Trim: Through-wall masonry flashings.
- I. Section 07 8400 Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
- J. Section 07 9200 Joint Sealants: Sealing control and expansion joints.

#### 1.03 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.
- B. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- D. ASTM A1064/A1064M Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- E. ASTM C90 Standard Specification for Loadbearing Concrete Masonry Units; 2014.

- F. ASTM C140/C140M Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2014.
- G. ASTM C144 Standard Specification for Aggregate for Masonry Mortar; 2011.
- H. ASTM C150/C150M Standard Specification for Portland Cement; 2015.
- I. ASTM C207 Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- J. ASTM C216 Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.
- K. ASTM C270 Standard Specification for Mortar for Unit Masonry; 2014a.
- L. ASTM C404 Standard Specification for Aggregates for Masonry Grout; 2011.
- M. ASTM C476 Standard Specification for Grout for Masonry; 2010.
- N. ASTM C780 Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.
- O. ASTM C979/C979M Standard Specification for Pigments for Integrally Colored Concrete; 2010.
- P. ASTM C1072 Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2013.
- Q. ASTM C1148 Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar; 1992a (Reapproved 2008).
- R. ASTM C1314 Standard Test Method for Compressive Strength of Masonry Prisms; 2014.
- S. ASTM E514/E514M Standard Test Method for Water Penetration and Leakage Through Masonry; 2014.
- T. BIA Technical Notes No. 7 Water Penetration Resistance Design and Detailing; 2005.
- U. UL (FRD) Fire Resistance Directory; current edition.
- 1.04 ADMINISTRATIVE REQUIREMENTS
  - A. Preinstallation Meeting: Convene a preinstallation meeting two weeks before starting work of this section; require attendance by all relevant installers.
  - B. Refer to Section 01 3000 Administrative Requirements for additional information.

#### 1.05 SUBMITTALS

- A. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, masonry accessories, and cleaning products including application .
- B. Samples: Submit four samples of decorative block and facing brick units to illustrate color, texture, and extremes of color range.
- C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements, including referenced material standards and fire ratings.
- D. Shop Drawings: Provide shop drawings of vertical wall reinforcement and bond beam reinforcement. Submit, with copies to the Owner's Independent Testing and Inspection Agency, shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Show details of construction, including dimensioned drawings, plans, elevations, sections, and details of components to be incorporated into Work including, but not limited to, the following:

- 1. Flashing System: Large-scale details for each element of flashing system showing layout, profiles, methods of joining, and anchorage details; including lintel units, shelf units, corner units, end dam units, drip edges, conditions showing interface and relationship to adjacent materials, and other special applications.
- 2. Fabricated Flashing: Detail corner units, end-dam units, drip edges, and other special applications.
- 3. Anchors, Ties, and Accessories: Show sizes, coursing, and locations.
- 4. Reinforcing: For masonry reinforcing bars; comply with ACI 315, "Details and Detailing of Concrete Reinforcement"showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement. Show elevations of reinforced walls.

## 1.06 INFORMATIONAL SUBMITTALS

- A. Material Test Reports: For each type of masonry unit, cementitious materials, and accessories required. Include data on material propertiesmaterial test reports substantiating compliance with requirements. For brick, include test report for efflorescence according to ASTM C 67.
  - 1. Provide test reports based on testing within previous two years.
- B. Material Certificates: Submit material certificates for the following, signed by manufacturer and Contractor. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.
  - 1. Each type of masonry unit.
  - 2. Cementitious materials. Include brand, type, and name of manufacturer. Provide certifications from manufacturer that no admixtures have been added to cementitious materials.
  - 3. Grout mixes. Include description of type and proportions of ingredients.
  - 4. Each material and grade indicated for reinforcing bars.
  - 5. Each type and size of joint reinforcement.
  - 6. Each type and size of anchors, ties, and metal accessory.
- C. Mix Designs: Submit material test reports for the Owner's Independent Testing and Inspection Agency, indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements.
  - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content. Include description of type and proportions of mortar ingredients.
  - 2. Include test reports, according to ASTM C 1019 for grout mixes required to comply with compressive strength requirement. Include description of type and proportions of grout ingredients.
- D. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 6000 Product Requirements, for additional provisions.
  - 2. Extra Pre-Faced Units: 50 of each type, size, and color combination.
- 1.07 QUALITY ASSURANCE
  - A. Installer Qualifications: The unit masonry work to be by a single firm specializing in exterior wall masonry work, for a period of not less than 5 years, so that there will be undivided responsibility in this single firm for such work.

- 1. The Installer must be experienced with work comparable to the work shown and specified and who has completed projects with a successful in-service performance for a period of not less than 5 years.
- 2. The Installer shall engage experienced and qualified subcontractors to perform any part of the masonry work which he is not equipped or qualified to perform properly with his own forces.
- B. Standards: Comply with the applicable provisions and recommendations of the following standards below, where standards conflict, the more stringent shall apply, and where a conflict between any stated standard and a project specific requirement of the specifications arise, the more stringent provision shall prevail.
  - 1. National Concrete Masonry Association (NCMA):"TEK" Information Series.
  - 2. American Concrete Institute (ACI):
    - a. ACI 530/ASCE 5/TMS 402: "Building Code Requirements for Masonry Structures."
      b. ACI 530.1/ASCE 6/TMS 602: "Specifications for Masonry Structures."
  - 3. Brick Industry Association (BIA) "Technical Notes on Brick Construction."
  - 4. Underwriters Laboratories, Inc. (UL) "Fire Resistance Ratings."
  - 5. American Society for Testing and Materials (ASTM) E 2266 "Standard Guide for Design and Construction of Low-Rise FrameBuilding Wall Systems to Resist Water Intrusion."
- C. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, through one source from a single manufacturer for each product required.
- D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
- E. Owner's Independent Testing and Inspection Agency: The Owner will engage a qualified independent testing and inspection agency to perform preconstruction testing indicated below for field quality control. Payment for these services will be made by Owner. Independent testing agency to coordinate submittal of "Special Inspections" testing documentation for State of Delaware (State) review and approval.
  - 1. The Contractor is responsible for the expense of testing or inspection resulting as a consequence of the following:
    - a. Work not evidencing compliance with this specification.
    - b. Testing to verify the adequacy of work done without prior notice, improper supervision, or contrary to standard construction practice.
  - 2. Contractor's Responsibilities:
    - a. Furnish labor required to facilitate testing.
    - b. Provide materials, samples and access to materials as required for testing.
    - c. Provide a complete set of shop and erection drawings, including revisions to previous Architect reviewed submittals.
  - 3. Owner's Independent Testing and Inspection Agency's Duties:
    - a. The Owner's Independent Testing and Inspection Agency shall conduct the following tests and inspections, interpret them, evaluate the results for compliance with the specifications, and report the findings to the Architect, Owner, Contractor, and Local Building Authority, as their interests may appear.
      - 1) Inspection and testing shall be in accordance with ACI requirements for masonry (ACI 530 and ACI 503.1) for the following inspections:
        - (a) Observation, sampling and placing of masonry units used in all reinforced masonry construction.

- (b) Inspection reports during reinforced masonry erection.
- (c) Observations of reinforcement condition, size and placement for compliance with ACI 530.
- (d) Ambient temperature during reinforced masonry erection.
- (e) Inspection of reinforced masonry materials to verify compliance with ACI 530.1.
- (f) Prism testing of masonry.
- (g) Observation of proportioning, mixing, consistency of mortar and grout for compliance with ACI 530.1.
- (h) Observation of application of mortar, grout and masonry units for compliance with ACI 530.1.
- (i) Observation of installation of anchors for compliance with ACI 530.
- b. Tests shall be conducted at the start of the job, using materials and mixes sampled at point of deposit.
- c. Testing of Mortar: The Owner's Independent Testing Laboratory shall verify mix consistency by daily testing in accordance with ASTM C780. Test shall establish specific and overall performance characteristics of the mortar system. Test reports shall be submitted to the Owner / Architect for review under the provisions of the Division 01 section under "General Requirements".
- d. Test of grout for reinforced masonry for compliance with ASTM C 476 requirements for the types specified and strength shown, conduct and report the following:
  - 1) Compressive strength (ASTM C 1019); lab cure and break at a time increment of one at 7 days, and two at 28 days; a minimum of 1 field test shall be made for each 5000 square feet of reinforced CMU wall. Make no less than 3 tests.
- e. Preliminary Test of Concrete Masonry Design Strength: With sufficient time, and not less than 28 days prior to the start of reinforced masonry construction, test for the compressive concrete masonry design strength (f'm) as specified. The value of f'm shall be determined by tests of masonry assemblies (prisms) in accordance with ACI 530.1. Not less than five prisms shall be taken as 8 inches for reinforced CMU.
- f. Field Tests of Concrete Masonry Design Strength: During construction, the value of the compressive concrete masonry design strength (f'm) shall be verified by field tests in accordance with the ACI and ASTM standards. A minimum of one field test shall be made for every 5000 square feet of reinforced CMU wall. Not less than three prisms shall be made for each field test. The thickness of the prisms shall be taken as 8 inches for the reinforced CMU.
- F. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

## 1.08 MOCK-UP

- A. Construct a masonry wall as a mock-up panel; include:
  - 1. Mortar and accessories.
  - 2. Structural backup.
  - 3. Flashings.
  - 4. Wall insulation.
  - 5. Brick watertable.
- B. Refer to Section 01 4000 Quality Requirements for additional information.

- C. Locate where directed.
- D. Mock-up may not remain as part of the Work.

## 1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
  - 1. Deliver masonry veneer units to the jobsite on covered banded pallets with cardboard between layers. Store pallets in single stacks on level ground and cover with waterproof covering to protect the units form inclement weather. Handle masonry veneer units carefully to avoid breakage and damage to the finished surfaces.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided. During cold weather stockpile aggregates so that it may be possible to heat them for use in mixing mortar in compliance with ACI recommendations for cold weather masonry practices.
- E. Deliver pre-blended dry mortar mix, if used for the project, in moisture-resistant containers designed for use with dispensing silos. Store pre-blended dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- F. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil. Do not use metal reinforcing or ties having loose rust or other coatings, including ice, that will reduce rust or destroy bond.

#### 1.10 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress. Prevent excess moisture from entering work in progress.
  - 1. Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.
  - 2. Protect door and window frames and exposed metal flashings from damage.
- B. Stain Prevention: Prevent mortar and soil from staining the face of masonry to be left exposed. Immediately remove mortar and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- C. Cold-Weather Requirements: Do not use metal reinforcing or ties having loose rust or other coatings that will reduce or destroy bond. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction

requirements contained in ACI 530.1/ASCE 6 and ACI 530/ASCE 5 and the following requirements:

- 1. If air temperature falls below 40 deg F, mixing water shall be heated.
- 2. If the air temperature falls between 20 deg F and 32 deg F inclusively, sand and water shall be heated.
- 3. If the air temperature falls below 20 deg F, in addition to the requirements of the preceding sub-paragraph, masonry units shall be heated, and heated enclosures shall be used with a minimum temperature of 40 deg F.
- 4. Masonry shall be protected from freezing for 24 hours after laying.
- D. Hot-Weather Requirements: When ambient temperature exceeds 100 deg F (38 deg C), or 90 deg F (32 deg C) with a wind velocity greater than 8 mph (13 km/h), do not spread mortar beds more than 48 inches (1200 mm) ahead of masonry. Set masonry units within one minute of spreading mortar. Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

## 1.11 DEFINITIONS

- A. Exterior: Areas exposed to the elements and areas located in unconditioned spaces
- B. Interior: Areas located in conditioned spaces

## PART 2 PRODUCTS

## 2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
  - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on the drawings for specific locations.
  - 2. Special Shapes: Provide non-standard blocks configured for corners, lintels, control joint edges, jambs, sash, acoustical units, and other detailed conditions.
  - 3. Load-Bearing Units: ASTM C90, lightweight.
    - a. Hollow block, as indicated.
- B. Decorative Concrete Masonry Units
  - 1. Ground Face and Split Face Block: ASTM C 90:
    - a. Size:
      - 1) Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
    - b. Pattern and Texture:
      - 1) Pattern: ground face and split face finish.
    - c. Color: To be selected from full range of manufacturer's standard colors.
      - 1) Ground Face Type 1: Parchment
      - 2) Ground Face Type 2: Terracotta
      - 3) Ground Face Type 3: Artic White
      - 4) Split Face Type 1: Cream
      - 5) Split Face Type 2: Adobe
      - 6) Split Face Type 3: Terracotta
  - 2. Shapes: Provide special shapes indicated, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 3. Manufacturers:
    - a. Basis of Design Ground Face Product: Oldcastle Building Products, Trenwyth Trendstone.
- 1) Subject to compliance with requirements, products by the following manufacturers are also acceptable:
  - (a) New Holland Concrete
  - (b) Fizzano Brothers; Groundface
- b. Basis of Design Split Face Product: Oldcastle Building Products, Split Face.
  - 1) Subject to compliance with requirements, products by the following manufacturers are also acceptable:
    - (a) New Holland Concrete
    - (b) Fizzano Brothers; Split Face
- c. Substitutions: See Section 01 6000 Product Requirements.
- C. Units with Integral Water Repellent: Provide exterior concrete block units as specified in this section with polymeric liquid admixture added to concrete masonry units at the time of manufacture.
  - 1. Performance of Units with Integral Water Repellent:
    - a. Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours.
      - 1) No water visible on back of wall above flashing at the end of 24 hours.
      - 2) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
      - 3) No more than 25 percent of wall area above flashing visibly damp at end of test.
    - b. Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
    - c. Compressive Strength: ASTM C1314; maximum 5 percent decrease.
    - d. Drying Shrinkage: ASTM C1148; maximum 5 percent increase in shrinkage.
  - 2. Use only in combination with mortar that also has integral water repellent admixture.
  - 3. Use water repellent admixtures for masonry units and mortar by a single manufacturer.
- 2.02 BRICK UNITS
  - A. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
    - 1. Basis of Design Manufacturer: Glen Gery Corporation: www.glengery.com.
    - 2. Color and texture: "Ravenna", sand finish.
    - 3. Actual size: 15-5/8" long x 3-5/8" high, x 3-5/8" deep.
    - 4. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect:
      - a. Jack arch units .
      - b. Soldier course units with solid corners.
      - c. Water table units, including inside and outside corner units.
    - 5. Other approved manufacturers, subject to compliance with requirements: a. Watsontown Brick Company, Atlantic Series, Bristol Sanded KT.
    - 6. Substitutions: See Section 001600 Product Requirements.

# 2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: not permitted.
- B. Portland Cement: ASTM C150/C150M, Type Ior Type II, without air entrainment.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Mortar Aggregate: ASTM C144: sand.
- E. Grout Aggregate: ASTM C404.

- F. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
  - 1. Color(s): To match Architect's sample(s) when incorporated into specified mix design(s).
- G. Water: Clean and potable.
- H. Accelerating Admixture: Not permitted.
- I. Integral Water Repellent Admixture for Mortar: Polymeric liquid admixture added to mortar at the time of manufacture.
  - 1. Use only in combination with concrete masonry units manufactured with integral water repellent admixture.
  - 2. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
  - 3. Meet or exceed performance specified for water repellent admixture used in masonry units.
    - a. Grace Construction Products, a unit of W. R. Grace & Co. Conn.; Dry-Block Mortar Admixture.
    - b. Master Builders, Inc.; Rheopel
    - c. Amerimix, an Oldcastle brand; AMX 410: www.amerimix.com.

# 2.04 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers:
  - 1. Blok-Lok Limited: www.blok-lok.com.
  - 2. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com.
  - 3. WIRE-BOND: www.wirebond.com.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; uncoated.
- C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- D. Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.
- E. Adjustable Multiple Wythe Joint Reinforcement: Truss type with adjustable ties spaced at 16 in on center ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face. Provide in lengths of not less than 10 feet (3 m),with prefabricated corner and tee units.
  - 1. Vertical adjustment: Not less than 3-1/2 inches.
- F. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
  - 1. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.

G. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch thick, adjustable, eye and pintle type, stainless steel, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in.

# 2.05 FLASHINGS

- A. See Section 076200 Sheet Metal Flashing and Trim.
- 2.06 ACCESSORIES
  - A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
  - B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding.
  - C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, duel level, trapezoidal shape and designed to prevent mortar droppings from clogging cavity weeps and allow proper cavity drainage.
    - 1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
      - a. Manufacturers:
        - 1) Mortar Net Solutions; MortarNet with Insect Barrier: www.mortarnet.com.
      - b. Locations: At flashing locations in brick veneer walls.
  - D. Cavity Weeps and Vents: Polyester mesh.
    - 1. Manufacturers:
      - a. CavClear/Archovations, Inc: www.cavclear.com.
      - b. Mortar Net Solutions: www.mortarnet.com.
      - c. Colors: selected from manufacturers standard range.
  - E. Steel Shelf Angles and Lintels: galvanized, see Section 05 1200 Structural Steel Framing and Section 05 5000 Metal Fabrications.
  - F. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142inch (3.6mm) steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.

### 2.07 MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
  - 1. Masonry below grade and in contact with earth: Type S.
  - 2. Exterior, loadbearing masonry: Type S.
  - 3. Exterior, non-loadbearing masonry: Type N.
  - 4. Interior, loadbearing masonry: Type S.
  - 5. Interior, non-loadbearing masonry: Type N.
- B. Mortar Type S: minimum 1800 psi, ASTM C 270.
- C. Mortar Type N: One (1) part Portland Cement, one (1) part hydrated lime, and six (6) parts sand.
- D. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
- E. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 of

ACI 530.1/ASCE 6/TMS 602 and ACI 530/ASCE 5 for dimensions of grout spaces and pour height. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

- F. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- G. Mixing: Use mechanical batch mixer and comply with referenced standards.
- 2.08 SOURCE QUALITY CONTROL
  - A. Owner may engage a qualified independent testing agency to perform source quality-control testing indicated below. Payment for these services will be made by Owner.
  - B. Brick Tests: For each type and grade of brick indicated, units will be tested according to ASTM C 67.
  - C. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, units will be tested according to ASTM C 140.

# PART 3 EXECUTION

# 3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

# 3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

# 3.03 INSTALLATION - GENERAL

- A. Comply with ACI 530.1/ASCE 6, ACI 530/ASCE 5, and other requirements indicated applicable to each type of installation included in Project.
- B. Use full size units without cutting, if possible.
  - 1. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges.
  - 2. Allow units to dry before laying unless wetting of units is specified.
  - 3. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
  - 1. Mix units from several pallets as they are placed.
- D. Wetting of Brick:
  - 1. Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67.
  - 2. Allow units to absorb water so they are damp but not wet at time of laying.
- E. Cover tops of all partially completed walls at end of day to protect completed work and prevent water from entering the cavity.
- F. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

# 3.04 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.
- 3.05 COURSING
  - A. Establish lines, levels, and coursing indicated. Protect from displacement.
  - B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
  - C. Concrete Masonry Units:
    - 1. Bond: Running.
    - 2. Coursing: One unit and one mortar joint to equal 8 inches.
    - 3. Mortar Joints: Concave.
  - D. Brick Units:
    - 1. Bond: Running.
    - 2. Coursing: Two units and two mortar joints to equal 8 inches.
    - 3. Mortar Joints: Concave.

### 3.06 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- F. Interlock intersections and external corners.
- G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- I. Cut mortar joints flush where wall tile is scheduled, cement parging is required, or resilient base is scheduled. Use square outside corners where wall tile is scheduled, corner guards are shown. Use bullnose outside corners at typical outside CMU corner.
- J. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- K. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.
- 3.07 WEEPS/CAVITY VENTS
  - A. Install weeps in veneer and cavity walls at 16 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.
  - B. Place weeps directly on flashing.
  - C. Do not strike mortar across bottom of weep.

- 1. If mortar is struck across weep, remove and replace weep.
- D. Install cavity vents in veneer and cavity walls at 24 inches on center horizontally near top of walls.

# 3.08 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar diverter at base of cavity full width of air space and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

# 3.09 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Reinforce joint corners and intersections with strap anchors 16 inches on center.
- F. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 16 inches horizontally and 16 inches vertically.

# 3.10 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.

### 3.11 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 16 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

# 3.12 REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHE UNIT MASONRY

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- F. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Space anchors at maximum of 16 inches horizontally and 16 inches vertically.

# 3.13 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
  - 1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up at least 8 inches, minimum, to form watertight pan at non-masonry construction.
  - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
  - 3. Seal lapped ends with a minimum of two beads of continuous sealant from leading edge of horizontal surface across and up entire height of vertical/sloped surface. Seal penetrations of flashing before covering with mortar.
  - 4. Fold flashing to create end dams at discontinuous ends. Turn up one course.
  - 5. Seal penetrations of flashing materials at cast stone and other anchors with compatible sealant or mastic.
- B. Extend metal flashings flush with the exterior face of masonry. Install flashing in two beads of butyl joint sealer Type 3 below flashing to prevent moisture migration under flashing. Refer to Section 07 9200 - Joint Sealants.
- C. Lap end joints of metal flashings at least 6 inches (152 mm) and seal watertight with Sealant Type 3.
  - 1. Refer to Sections 07 6200 Sheet Metal Flashing and Trim and 07 9200 Joint Sealants.

# 3.14 LINTELS

- A. Install loose steel lintels over openings.
- B. Maintain minimum 8 inch bearing on each side of opening.

### 3.15 GROUTED COMPONENTS

- A. Reinforce bond beams as noted on the Contract Drawings.
- B. Lap splices minimum 24 bar diameters.
- C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- D. Place and consolidate grout fill without displacing reinforcing.
- E. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.
- F. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

# 3.16 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
- C. Size control joints as indicated on drawings; if not indicated, 3/8 inch wide and deep.
- D. Form expansion joint as detailed on drawings.

### 3.17 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames, window frames, anchor bolts, plates, and louvers and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.

- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
  - 1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

# 3.18 TOLERANCES

- A. Maximum Variation from Alignment of Columns: 1/4 inch.
- B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

# 3.19 CUTTING AND FITTING

- A. Cut and fit for chases, pipes, conduit, sleeves, grounds, and other items. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

# 3.20 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
- B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for conformance to requirements of this specification.
- C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

# 3.21 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.
- 3.22 PROTECTION
  - A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

# **END OF SECTION**

# **SECTION 04 7200**

# CAST STONE MASONRY

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Architectural cast stone.
- B. Units required are:
  - 1. Exterior wall units, including sills.
  - 2. Other items indicated on the drawings.

### 1.02 RELATED REQUIREMENTS

- A. Section 04 2000 Unit Masonry: Installation of cast stone in conjunction with masonry.
- B. Section 07 9200 Joint Sealants: Sealing joints indicated to be left open for sealant.

### 1.03 REFERENCE STANDARDS

- A. ACI 318 Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).
- B. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- D. ASTM A767/A767M Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009 (Reapproved 2015).
- E. ASTM A884/A884M Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2014.
- F. ASTM A1064/A1064M Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- G. ASTM C33/C33M Standard Specification for Concrete Aggregates; 2013.
- H. ASTM C150/C150M Standard Specification for Portland Cement; 2015.
- I. ASTM C270 Standard Specification for Mortar for Unit Masonry; 2014a.
- J. ASTM C494/C494M Standard Specification for Chemical Admixtures for Concrete; 2013.
- K. ASTM C1364 Standard Specification for Architectural Cast Stone; 2016.
- 1.04 SUBMITTALS
  - A. See Section 01 3000 Administrative Requirements, for submittal procedures.
  - B. Product Data: Test results of cast stone components made previously by the manufacturer.
  - C. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
  - D. Mortar Color Selection Samples.
  - E. Verification Samples: Pieces of actual cast stone components not less than 6 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.
  - F. Source Quality Control Test Reports.
  - G. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. A firm with a minimum of 5 years experience producing cast stone of types required for project.
  - 2. Current producer member of the Cast Stone Institute or the Architectural Precast Association.
  - 3. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.

### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
- B. Number each piece individually to match shop drawings and schedule.
- C. Store cast stone components and installation materials in accordance with manufacturer's instructions.
- D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
- F. Store mortar materials where contamination can be avoided.
- G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

# PART 2 PRODUCTS

# 2.01 MANUFACTURERS

- A. Architectural Cast Stone:
  - 1. Any current producer member of the Architectural Precast Association.
  - 2. Any current producer member of the Cast Stone Institute.
- 2.02 ARCHITECTURAL CAST STONE
  - A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C1364.
    - 1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
    - 2. Freeze-Thaw Resistance: Demonstrated by field experience.
    - 3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
    - 4. Remove cement film from exposed surfaces before packaging for shipment.
  - B. Shapes: Provide shapes indicated on drawings.
    - 1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
    - 2. Unless otherwise indicated on drawings, provide:
      - a. Wash or slope of 1:12 on exterior horizontal surfaces.
      - b. Drips on projecting components, wherever possible.
      - c. Raised fillets at back of sills and at ends to be built in.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.

# 2.03 MATERIALS

- A. Portland Cement: ASTM C150/C150M.1. For Mortar: Type I or II, except Type III may be used in cold weather.
- B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
- C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
- D. Admixtures: ASTM C494/C494M.
- E. Water: Potable.
- F. Reinforcing Bars: ASTM A615/A615M deformed bars, galvanized.1. Galvanized in accordance with ASTM A767/A767M, Class I.
- G. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.
- H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
- I. Shelf Angles and Similar Structural Items: Hot-dip galvanized steel per ASTM A123/A123M, of shapes and sizes as required for conditions.
- J. Mortar: Portland cement-lime, ASTM C270, Type N; do not use masonry cement.
- K. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

# PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.
- B. Do not begin installation until unacceptable conditions have been corrected.

### 3.02 INSTALLATION

- A. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 2000.
- B. Mechanically anchor cast stone units indicated; set remainder in mortar.
- C. Setting:
  - 1. Drench cast stone components with clear, running water immediately before installation.
  - 2. Set units in a full bed of mortar unless otherwise indicated.
  - 3. Fill vertical joints with mortar.
  - 4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
- D. Joints: Make all joints 3/8 inch, except as otherwise detailed.
  - 1. Rake mortar joints 3/4 inch for pointing.
  - 2. Remove excess mortar from face of stone before pointing joints.
  - 3. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
  - 4. Leave the following joints open for sealant:
    - a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.

- b. Joints in projecting units.
- c. Joints between rigidly anchored units, including soffits, panels, and column covers.
- d. Joints below lugged sills and stair treads.
- e. Joints below ledge and relieving angles.
- f. Joints labeled "expansion joint".
- E. Repairs: Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet.
  - 1. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
  - 2. Repair methods and results subject to Architect 's approval.
- 3.03 CLEANING
  - A. Keep cast stone components clean as work progresses.
- 3.04 PROTECTION
  - A. Protect completed work from damage.
  - B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.
- 3.05 SCUEDULE
  - A. Provide window sills, keystones and other trim as shown.

# END OF SECTION

# SECTION 051200 – STRUCTURAL STEEL

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Structural steel.
  - 2. Grout.
- B. Related Sections include the following:
  - 1. Division 1 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
  - 2. Division 5 Section "Steel Deck" for field installation of shear connectors.
  - 3. Division 5 Section "Metal Fabrications" for steel lintels or shelf angles not attached to structural-steel frame miscellaneous steel fabrications and other metal items not defined as structural steel.
  - 4. Division 9 painting Sections for surface preparation and priming requirements.

#### 1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand ASD-service loads indicated and comply with other information and restrictions indicated.
  - 1. Select and complete connections using schematic details indicated and AISC's "Manual of Steel Construction, Allowable Stress Design," Part 4
- B. Construction: Type 2, simple framing.

### 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Include embedment drawings.
  - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
  - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
- C. Welding certificates.
- D. Qualification Data: For Installer, fabricator, professional engineer, testing agency.
- E. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
  - 1. Structural steel including chemical and physical properties.
  - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  - 3. Direct-tension indicators.
  - 4. Tension-control, high-strength bolt-nut-washer assemblies.
  - 5. Shear stud connectors.
  - 6. Shop primers.
  - 7. Nonshrink grout.
- F. Source quality-control test reports.

### 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD. If the fabricator does not have the AISC certification they can still bid the project but they are responsible to have a third party inspector inspect the fabrication process to ensure they are meeting AISC guidelines.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

- D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."
- E. Comply with applicable provisions of the following specifications and documents:
  - 1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  - 2. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
  - 3. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
  - 4. AISC's "Specification for the Design of Steel Hollow Structural Sections."
  - 5. AISC's "Specification for Allowable Stress Design of Single-Angle Members"
  - 6. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- F. Mockups: Build mockups of architecturally exposed structural steel to set quality standards for fabrication and installation.
  - 1. Coordinate finish painting requirements with Division 9 painting Sections.
  - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
  - 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

### 1.8 COORDINATION

A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

### 2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Corrosion-Resisting Structural Steel: ASTM A 588/A 588M, Grade 50 (345).
- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- F. Corrosion-Resisting Cold-Formed Hollow Structural Sections: ASTM A 847, structural tubing.
- G. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
  - 1. Weight Class: Standard, Extra strong, or Double-extra strong, as indicated.
  - 2. Finish: Black, except where indicated to be galvanized.
- H. Medium-Strength Steel Castings: ASTM A 27/A 27M, Grade 65-35 (Grade 450-240), carbon steel.
- I. High-Strength Steel Castings: ASTM A 148/A 148M,Grade 80-50 (Grade 550-345), carbon or alloy steel.
- J. Welding Electrodes: Comply with AWS requirements.

### 2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
  - 1. Finish: Plain.
  - 2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8,) compressible-washer type.
    - a. Finish: Plain
- B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- C. Unheaded Anchor Rods: ASTM F 1554, Grade 36

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- 1. Configuration: Straight or Hooked, as indicated.
- 2. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
- 3. Plate Washers: ASTM A 36/A 36M carbon steel.
- 4. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
- 5. Finish: Plain
- D. Headed Anchor Rods: ASTM F 1554, Grade 36 straight.
  - 1. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
  - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
  - 3. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
  - 4. Finish: Plain
- E. Threaded Rods: ASTM A 36/A 36M
  - 1. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
  - 2. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
  - 3. Finish: Plain
- F. Eye Bolts and Nuts: ASTM A 108, Grade 1030, cold-finished carbon steel.
- G. Sleeve Nuts: ASTM A 108, Grade 1018, cold-finished carbon steel.

# 2.3 PRIMER

- A. Primer: SSPC-Paint 25, Type I, iron oxide, zinc oxide, raw linseed oil, and alkyd.
- B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.
- C. Galvanizing Repair Paint: ASTM A 780.

### 2.4 GROUT

- A. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404, Size No. 2. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- B. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

## 2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design
  - 1. Camber structural-steel members where indicated.
  - 2. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
  - 3. Mark and match-mark materials for field assembly.
  - 4. Complete structural-steel assemblies, including welding of units, before starting shoppriming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
- G. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk, cross-recessed head machine screws, uniformly spaced not more than 10 inches (250 mm) o.c., unless otherwise indicated.
- H. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  - 2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

# 2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
  - 1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
  - 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
  - 3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
    - a. Grind butt welds flush.
    - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

# 2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
  - 2. Surfaces to be field welded.
  - 3. Surfaces to be high-strength bolted with slip-critical connections.
  - 4. Surfaces to receive sprayed fire-resistive materials.
  - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  - 1. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  - 2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

STRUCTURAL STEEL Revision 0 – 03/05/2018 D. Painting: Apply a 1-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

# 2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/ A 123M.
  - 1. Fill vent holes and grind smooth after galvanizing.
  - 2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

# 2.9 SOURCE QUALITY CONTROL

- A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
  - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
  - 1. Liquid Penetrant Inspection: ASTM E 165.
  - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - 3. Ultrasonic Inspection: ASTM E 164.
  - 4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:
  - 1. Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

# 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
- B. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
  - 1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Weld plate washers to top of base plate.
  - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
  - 4. Promptly pack grout solidly between bearing surfaces and base or bearing 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.
- C. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

- 1. Level and plumb individual members of structure.
- 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- G. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1].
- H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

# 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
  - 1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
  - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
  - 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
  - 4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
    - a. Grind butt welds flush.
    - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

# 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
  - 1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
  - 1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

### 3.6 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel.
  - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
  - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 9 painting Sections.

END OF SECTION 051200

SECTION 053100 - STEEL DECK

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Roof deck.
  - 2. Acoustical cellular roof deck.
  - 3. Composite floor deck.
  - 4. Acoustical cellular composite floor deck.
- B. Related Sections include the following:
  - 1. Division 03 Section "Cast-in-Place Concrete" for concrete fill.
  - 2. Division 05 Section "Structural Steel" for shop- and field-welded shear connectors.
  - 3. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
  - 4. Division 09 painting Sections for repair painting of primed deck.
  - 5. Division 16 Section "Underfloor Raceways" for preset inserts, activation kits, after set inserts, service fittings, header ducts, and trench header ducts used with cellular floor-deck systems.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product Certificates: For each type of steel deck, signed by product manufacturer.
- D. Welding certificates.
- E. Field quality-control test and inspection reports.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
  - 1. Power-actuated mechanical fasteners.

- 2. Acoustical roof deck.
- 3. Acoustical floor deck.
- G. Research/Evaluation Reports: For steel deck.

### 1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
- B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
  - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- E. Electrical Raceway Units: Provide UL-labeled cellular floor-deck units complying with UL 209 and listed in UL's "Electrical Construction Equipment Directory" for use with standard header ducts and outlets for electrical distribution systems.
- F. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

# 1.5 DELIVERY, STORAGE, AND HANDLING

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

# 1.6 COORDINATION

A. Coordinate installation of sound-absorbing insulation strips in topside ribs of acoustical deck with roofing installation specified in Division 07 to ensure protection of insulation strips against damage from effects of weather and other causes.

# PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Steel Deck:
    - a. ASC Profiles, Inc.
    - b. Canam Steel Corp.; The Canam Manac Group.
    - c. Consolidated Systems, Inc.
    - d. DACS, Inc.
    - e. D-Mac Industries Inc.
    - f. Epic Metals Corporation.
    - g. Marlyn Steel Decks, Inc.
    - h. New Millennium Building Systems, LLC.
    - i. Nucor Corp.; Vulcraft Division.
    - j. Roof Deck, Inc.
    - k. United Steel Deck, Inc.
    - 1. Valley Joist; Division of EBSCO Industries, Inc.
    - m. Verco Manufacturing Co.
    - n. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

### 2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
  - 1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
    - a. Color: Manufacturer's standard
  - 2. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 zinc coating.
  - 3. Deck Profile: As indicated.
  - 4. Profile Depth: As indicated.

- 5. Design Uncoated-Steel Thickness: As indicated.
- 6. Span Condition: Triple span or more.
- 7. Side Laps: Overlapped.

### 2.3 ACOUSTICAL ROOF DECK

- A. Acoustical Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
  - 1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
    - a. Color: Manufacturer's standard
  - 2. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
    - a. Color: Manufacturer's standard
  - 3. Deck Profile: As indicated
  - 4. Cellular Deck Profile: As indicated
  - 5. Profile Depth: As indicated
  - 6. Design Uncoated-Steel Thickness: As indicated
  - 7. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated
  - 8. Span Condition: Triple span or more
  - 9. Side Laps: Overlapped
  - 10. Acoustical Perforations: Cellular deck units with manufacturer's standard perforated flatbottom plate welded to ribbed deck.
  - 11. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.
    - a. Factory install sound-absorbing insulation into cells of cellular deck.
    - b. Installation of sound-absorbing insulation is specified in Division 07 Section
  - 12. Acoustical Performance: NRC 0.60 for 1 <sup>1</sup>/<sub>2</sub>" roof deck depth and NRC 0.70 for 3" roof deck depth, tested according to ASTM C 423 or as indicated on drawings.

### 2.4 COMPOSITE FLOOR DECK

- A. Composite Steel Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:
  - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 G60 zinc coating.
  - 2. Profile Depth: As indicated.
  - 3. Design Uncoated-Steel Thickness: As indicated.
  - 4. Span Condition: Triple span or more.

### 2.5 ACOUSTICAL CELLULAR COMPOSITE FLOOR DECK

- A. Acoustical Cellular Composite Steel Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:
  - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 G60 zinc coating.
  - 2. Cellular Deck Type: Composite
  - 3. Profile Depth: As indicated.
  - 4. Design Uncoated-Steel Thickness: As indicated.
  - 5. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated
  - 6. Span Condition: Triple Span or more.
  - 7. Acoustical Perforations: Cellular deck units with manufacturer's standard perforated flatbottom plate welded to ribbed deck.
  - 8. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.
    - a. Factory install sound-absorbing insulation into cells of cellular deck.
    - b. Installation of sound-absorbing insulation is specified in Division 07 Section
  - 9. Acoustical Performance: NRC 0.70 for 2" composite floor deck tested according to ASTM C 423 or as indicated on drawings.

### 2.6 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile As indicated.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

- H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch (1.52 mm) thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter.
- J. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch- (76-mm-) wide flanges and sloped recessed pans of 1-1/2-inch (38-mm) minimum depth. For drains, cut holes in the field.
- K. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.
- L. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- M. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

#### 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
  - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

### 3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:
  - 1. Weld Diameter: 5/8 inch (16 mm) nominal.
  - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 18 inches (450 mm) apart, maximum or as indicated.
  - 3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 36 inches (910 mm)], and as follows:
  - 1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
  - 2. Mechanically clinch or button punch.
  - 3. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
  - 1. End Joints: Lapped 2 inches (51 mm) minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or mechanical fasteners not more than 12 inches (305 mm) apart with at least one weld or fastener at each corner.
  - 1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
  - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.
- G. Sound-Absorbing Insulation: Installation into topside ribs of deck as specified in Division 07

# 3.4 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
  - 1. Weld Diameter: 5/8 inch (16 mm) nominal.
  - 2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm) apart.
  - 3. Weld Spacing: Space and locate welds as indicated.
  - 4. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches (910 mm), and as follows:
  - 1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
  - 2. Mechanically clinch or button punch.
  - 3. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm)with end joints as follows:
  - 1. End Joints: Lapped
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- F. Install piercing hanger tabs at 14 inches (355 mm) apart in both directions, within 9 inches (228 mm) of walls at ends, and not more than 12 inches (305 mm) from walls at sides, unless otherwise indicated.

### 3.5 FIELD QUALITY CONTROL

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

# 3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on **both surfaces** of prime-painted deck immediately after installation, and apply repair paint.
  - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
  - 2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Division 09 Section.
- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

#### END OF SECTION 053100

# SECTION 054000 – COLD-FORMED METAL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:1. Exterior non-load-bearing wall framing.
- B. Related Sections include the following:
  - 1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
  - 2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
  - 3. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for interior non-loadbearing, metal-stud-framed, shaft-wall assemblies.

### 1.3 PERFORMANCE REQUIREMENTS

- 1.4 SUBMITTALS
  - A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
  - B. Shop Drawings: Design cold form framing walls per the applicable design loading & provide signed & sealed shop drawings by a Registered Professional Engineer in the State of Delaware indicating stud sizes, gauges, spacing, and connections / attachments to adjoining work.
  - C. Welding certificates.
  - D. Qualification Data: For testing agency.
  - E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
    - 1. Steel sheet.
    - 2. Expansion anchors.
    - 3. Power-actuated anchors.

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- 4. Mechanical fasteners.
- 5. Vertical deflection clips.
- 6. Horizontal drift deflection clips
- 7. Miscellaneous structural clips and accessories.
- F. Research/Evaluation Reports: For cold-formed metal framing.

### 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- D. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing General Provisions."
  - 1. Comply with AISI's "Standard for Cold-Formed Steel Framing Truss Design."
  - 2. Comply with AISI's "Standard for Cold-Formed Steel Framing Header Design."
- F. Comply with AISI's "Standard for Cold-Formed Steel Framing Prescriptive Method for One and Two Family Dwellings."
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
  - 1. AllSteel Products, Inc.
  - 2. Craco Metals Manufacturing, LLC.
  - 3. Dale/Incor.
  - 4. Dietrich Metal Framing; a Worthington Industries Company.
  - 5. MarinoWare; a division of Ware Industries.
  - 6. United Metal Products, Inc.

### 2.2 MATERIALS

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: As Indicated & designed by CFMF engineer.
  - 2. Coating: G60 (Z180).
- C. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
  - 1. Grade: 50 (340), Class 1 or 2.
  - 2. Coating: G60 (Z275).

### 2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 18 gauge at full height walls supporting metal panel / siding & 16 gauge at full height walls supporting masonry veneer. Final design to be performed & provided by CFMF manufacture's design professional engineer.
  - 2. Section Properties: As Indicated
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 18 gauge
  - 2. Flange Width: As Indicated
- C. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Dietrich Metal Framing; a Worthington Industries Company.
    - b. MarinoWare, a division of Ware Industries.
    - c. SCAFCO Corporation
    - d. The Steel Network, Inc.
- D. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
  - 1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:
    - a. Minimum Base-Metal Thickness: 18 gauge
    - b. Flange Width: As Indicated.
  - 2. Inner Track: Of web depth indicated, and as follows:
    - a. Minimum Base-Metal Thickness: 18 gauge
    - b. Flange Width: As Indicated
- E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

### 2.4 FRAMING ACCESSORIES

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

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

### 2.5 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
  - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

### 2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and

COLD-FORMED METAL FRAMING Revision 0 – 03/05/2018 plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

- D. Shims: Load bearing, high-density multimonomer plastic, nonleaching.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

### 2.7 FABRICATION

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  - 1. Fabricate framing assemblies using jigs or templates.
  - 2. Cut framing members by sawing or shearing; do not torch cut.
  - 3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
  - 4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
  - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  - 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

### 3.2 PREPARATION

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

### 3.3 INSTALLATION, GENERAL

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
  - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).
- D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1.Cut framing members by sawing or shearing; do not torch cut.COLD-FORMED METAL FRAMING05 40 00-7Revision 0 - 03/05/201805 40 00-7

- 2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
  - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
  - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- H. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
  - 1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

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

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
  - 1. Stud Spacing: As Indicated by CFMF engineer with maximum 16" o/c.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  - 1. Install double deep-leg deflection tracks and anchor outer track to building structure.
  - 2. Connect vertical deflection clips to bypassing studs and anchor to building structure.
  - 3. Connect drift clips to cold formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.
  - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
    - a. Install solid blocking at centers indicated.
  - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
  - 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
  - 4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

### 3.5 FIELD QUALITY CONTROL

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

### 3.6 REPAIRS AND PROTECTION

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

# SECTION 054400 - COLD-FORMED METAL TRUSSES

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Cold-formed steel trusses for roofs.

### 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. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings:
  - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel trusses; fabrication; and fastening and anchorage details, including mechanical fasteners.
  - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
- D. Delegated-Design Submittal: For cold-formed steel trusses.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product test reports.
- D. Field quality-control reports.

### 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."
  - 2. AWS D1.3/D1.3M, "Structural Welding Code Sheet Steel."

### PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. <u>Manufacturers</u>: 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. <u>Aegis Metal Framing</u>.
  - 2. <u>Genesis Worldwide Inc</u>.
  - 3. <u>Marino/WARE</u>.
  - 4. <u>Nuconsteel, A Nucor Company</u>.
  - 5. <u>Steel Construction Systems</u>.
  - 6. <u>TrusSteel; an ITW company</u>.
  - 7. <u>USA Frametek</u>.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel trusses capable of withstanding design loads within limits and under conditions indicated.
  - 1. Design Loads: As indicated.
  - 2. Deflection Limits: Design trusses to withstand design loads without deflections greater than the following:
    - a. Roof Trusses: Vertical deflection of 1/360 of the span.
  - 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).

C. Cold-Formed Steel Framing Design Standards:

- 1. Floor and Roof Systems: Design according to AISI S210.
- 2. Lateral Design: Design according to AISI S213.
- 3. Roof Trusses: Design according to AISI S214.
- D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

### 2.3 COLD-FORMED STEEL TRUSS MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Steel Sheet: ASTM A 1003/A 1003M, structural grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: As required by structural performance.
  - 2. Coating: G60 (Z180), A60 (ZF180), AZ50 (AZ150), or GF30 (ZGF90).

### 2.4 ROOF TRUSSES

- A. Roof Truss Members: Manufacturer's standard C-shaped steel sections.
  - 1. Connecting Flange Width: 1-5/8 inches (41 mm), minimum at top and bottom chords connecting to sheathing or other directly fastened construction.
  - 2. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm) or as required for design.
  - 3. Section Properties: As required for design

### 2.5 ACCESSORIES

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

### 2.6 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbonsteel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and Appendix D in ACI 318,

greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

- D. Power-Actuated Fasteners: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
  - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

# 2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.
- B. Shims: Load bearing, of high-density multimonomer plastic, nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

### 2.8 FABRICATION

- A. Fabricate cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  - 1. Fabricate trusses using jigs or templates.
  - 2. Cut truss members by sawing or shearing; do not torch cut.
  - 3. Fasten cold-formed steel truss members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator.
    - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
  - 4. Fasten other materials to cold-formed steel trusses by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace trusses to withstand handling, delivery, and erection stresses. Lift fabricated trusses to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
  - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

### PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed steel trusses without reducing thickness of fire-resistive materials below that is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

### 3.2 INSTALLATION

- A. Install, bridge, and brace cold-formed steel trusses according to AISI S200, AISI S214, AISI's "Code of Standard Practice for Cold-Formed Steel Structural Framing," and manufacturer's written instructions unless more stringent requirements are indicated.
- B. Install cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened.
  - 1. Fasten cold-formed steel trusses by welding or mechanical fasteners.
    - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings; comply with requirements for spacing, edge distances, and screw penetration.
- C. Install temporary bracing and supports. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- D. Truss Spacing: 48 inches (1220 mm) or as indicated.
- E. Do not alter, cut, or remove framing members or connections of trusses.
- F. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated.
- G. Erect trusses without damaging framing members or connections.
- H. Coordinate with wall framing to align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.

- I. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to CFSEI's TechNote 551e, "Design Guide: Permanent Bracing of Cold-Formed Steel Trusses.".
- J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
  - 1. Space individual trusses no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

### 3.3 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform inspections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Field and shop welds will be subject to testing and inspecting.
- D. Prepare test and inspection reports.

### 3.4 REPAIRS AND PROTECTION

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

# SECTION 05 5000 METAL FABRICATIONS

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Shop fabricated metal items as scheduled herein.
- 1.02 RELATED REQUIREMENTS
  - A. Section 03 3000 Cast-in-Place Concrete: Placement of metal fabrications in concrete.
  - B. Section 04 2000 Unit Masonry: Placement of metal fabrications in masonry.
  - C. Section 051200: Structural steel anchor bolts and related work.
  - D. Section 09 9000 Paints and Coatings
- 1.03 REFERENCE STANDARDS
  - A. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
  - B. ANSI A14.3 American National Standard for Ladders -- Fixed -- Safety Requirements; 2008.
  - C. ASTM A36/A36M Standard Specification for Carbon Structural Steel; 2014.
  - D. ASTM A48/A48M Standard Specification for Gray Iron Castings; 2003 (Reapproved 2012).
  - E. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
  - F. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
  - G. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
  - H. ASTM A283/A283M Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
  - I. ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.
  - J. ASTM A500/A500M Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
  - K. ASTM A501/A501M Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
  - L. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
  - M. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
  - N. ASTM B209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
  - O. ASTM B210 Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2012.
  - P. ASTM B210M Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes (Metric); 2012.

- Q. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- R. ASTM B221M Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- S. ASTM F3125/F3125M Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.
- T. AWS A2.4 Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- U. AWS D1.1/D1.1M Structural Welding Code Steel; 2015 (Errata 2016).
- V. AWS D1.2/D1.2M Structural Welding Code Aluminum; 2008.
- W. SSPC-Paint 15 Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- X. SSPC-Paint 20 Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- Y. SSPC-SP 2 Hand Tool Cleaning; 1982 (Ed. 2004).

# 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
  - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.
- 1.05 QUALITY ASSURANCE
  - A. Design fabricated items under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Delaware.

### PART 2 PRODUCTS

- 2.01 MATERIALS STEEL
  - A. Steel Sections: ASTM A36/A36M.
  - B. Steel Tubing: ASTM A500, Grade B cold-formed, or ASTM A 501 hot-formed, structural tubing.
  - C. Plates: ASTM A283/A283M.
  - D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black and hot-dip galvanized finish, as indicated.
  - E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
  - F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
  - G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
  - H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I Inorganic, complying with VOC limitations of authorities having jurisdiction.

### 2.02 MATERIALS - ALUMINUM

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
- B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.
- C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210 (ASTM B210M), 6063 alloy, T6 temper.
- D. Bolts, Nuts, and Washers: Stainless steel.
- E. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

### 2.03 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

### 2.04 FABRICATED ITEMS

- A. Supply and install metal fabrications listed below complete with anchorage and attachments necessary for installation.
- B. Steel lintels:
  - 1. Provide hot dip galvanized loose steel lintels in masonry. Lintels shall be provided for all exterior masonry veneer openings and as shown on the drawings. Bear lintels 8" on masonry at each jamb.
  - 2. Refer to structural drawings for sizes.
- C. Steel edge angle at overhead coiling and sectional doors: size and configuration as shown; hot-dipped galvanized.

### 2.05 MANUFACTURED PRODUCTS

- A. Supply and install metal fabrications listed below complete with anchorage and attachments necessary for installation.
- B. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; galvanized finish.
  - 1. 6" G-90 galvanized standard weight steel pipe.
  - 2. Fill with 3,000 psi concrete.
  - 3. Slightly overfill top for drainage.
  - 4. Bollard Cover:
    - a. High Density Polyethylene (HDPE) post cover
    - b. Color: Yellow
    - c. Product Model No.: CL1686FF
    - d. Manufacturer: Post Guard, distributed by Global Insdutrial.
- C. Door Frames for Overhead Door Openings: Channel sections; galvanized finish.

### 2.06 DOWNSPOUT BOOTS

- A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots, integral cleanout, cleanout cover, and tamper proof fasteners.
  - 1. Configuration: Offset.
  - 2. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
  - 3. Finish: Manufacturer's standard factory applied powder coat finish.
  - 4. Color: To be selected by Architect from manufacturer's standard range.
  - 5. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, integral neoprene gaskets, and rubber coupling.
  - 6. Manufacturers:
    - a. Downspoutboots.com, a division of J. R. Hoe & Sons; O Series: www.downspoutboots.com.
    - b. Neenah Foundry, a division of Neenah Enterprises, Inc; Model R-4929-O6C: www.nfco.com.
    - c. Substitutions: See Section 01 6000 Product Requirements.

### 2.07 FINISHES - STEEL

- A. Prime paint steel items.
  - 1. Exceptions: Galvanize items to be embedded in concrete or masonry.
  - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

### 2.08 FINISHES - ALUMINUM

- A. Exterior Aluminum Surfaces: Class I natural anodized.
- B. Interior Aluminum Surfaces: Class I natural anodized.
- C. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
- D. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

### 2.09 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

# PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that field conditions are acceptable and are ready to receive work.

### 3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

### 3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated on drawings and/or on shop drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

### 3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

# SECTION 05 5213 PIPE AND TUBE RAILINGS

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Wall mounted handrails.
- B. Free-standing railings.

### 1.02 RELATED REQUIREMENTS

- A. Section 05 5100 Metal Stairs: Handrails other than those specified in this section.
- B. Section 09 2116 Gypsum Board Assemblies: Placement of backing plates in stud wall construction.
- C. Section 09 9000 Paints and Coatings

### 1.03 REFERENCE STANDARDS

- A. ADA Standards Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM E935 Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.
- C. ASTM E985 Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).

### 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
- C. Samples: Submit two, 12 inch long samples of handrail. Submit two samples of elbow, wall bracket, and end stop.

### PART 2 PRODUCTS

- 2.01 RAILINGS GENERAL REQUIREMENTS
  - A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.
  - B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set.
  - C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set.
  - D. Allow for expansion and contraction of members and building movement without damage to connections or members.
  - E. Dimensions: See drawings for configurations and heights.
  - F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

G. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

### 2.02 STEEL RAILING SYSTEM

- A. Exterior railings and guards:
  - 1. Stainless steel.
- B. Interior railings and guards:
  - 1. Painted steel, with stainless steel handrails.
- C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- D. Exposed Fasteners: No exposed bolts or screws.
- E. Straight Splice Connectors: Steel concealed spigots.

### 2.03 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
  - 1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
  - 2. Interior Components: Continuously seal joined pieces by continuous welds.
  - 3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

### PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that field conditions are acceptable and are ready to receive work.
- 3.02 PREPARATION
  - A. Clean and strip primed steel items to bare metal where site welding is required.
  - B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

### 3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- D. Anchor railings securely to structure.
- E. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.

F. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

### 3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

# SECTION 06 1000 ROUGH CARPENTRY

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Rough opening framing for doors, windows, and roof openings.
- B. Roofing nailers.
- C. Preservative treated wood materials.
- D. Fire retardant treated wood materials.
- E. Concealed wood blocking, nailers, and supports.
- 1.02 RELATED REQUIREMENTS
  - A. Section 03 3000 Cast-in-Place Concrete: Setting anchors in concrete.
  - B. Section 07 2500 Weather Barriers: Air barrier over sheathing.
- 1.03 REFERENCE STANDARDS
  - A. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
  - B. ASTM D2898 Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010.
  - C. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
  - D. AWPA U1 Use Category System: User Specification for Treated Wood; 2012.
  - E. PS 1 Structural Plywood; 2009.
  - F. PS 20 American Softwood Lumber Standard; 2010.

### 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials and application instructions.
- C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.
- D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
- E. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- F. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.
- G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- 1.05 QUALITY ASSURANCE
  - A. Air Barrier Association of America (ABAA) Evaluated Materials Program (EAP); www.airbarrier.org/#sle: Use evaluated materials from a single manufacturer regularly engaged

in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.
- 1.07 WARRANTY
  - A. See Section 01 7800 Closeout Submittals, for additional warranty requirements.

# PART 2 PRODUCTS

- 2.01 GENERAL REQUIREMENTS
  - A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
    - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
    - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
  - B. Lumber fabricated from old growth timber is not permitted.

### 2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  - 1. Lumber: S4S, No. 2 or Standard Grade.
  - 2. Boards: Standard or No. 3.

### 2.03 CONSTRUCTION PANELS

- A. Roof Sheathing: Plywood, PS 1
  - 1. Bond Classification: Exterior.
  - 2. Span Rating: 32.
  - 3. Performance Category: 5/8 PERF CAT.
- B. Wall Sheathing: Plywood, PS 1, Grade C-C, Exterior Exposure.
- C. Communications and Electrical Room Mounting Boards: PS 1 A-C plywood; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- D. Other Applications:
  - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
  - 2. Other Locations: PS 1, C-D Plugged or better.
- 2.04 ACCESSORIES
  - A. Fasteners and Anchors:
    - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

- 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
- 3. Anchors: Toggle bolt type for anchorage to hollow masonry.

### 2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
  - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
  - 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Fire Retardant Treatment:
  - 1. Manufacturers:
    - a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
    - b. Hoover Treated Wood Products, Inc: www.frtw.com.
    - c. Koppers, Inc: www.koppers.com.
    - d. Substitutions: See Section 01 6000 Product Requirements.
  - 2. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
    - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
    - b. Treat plywood panels that are a substrate for PVC trim.
    - c. Treat other rough carpentry items as indicated.
    - d. Do not use treated wood in direct contact with the ground.
  - 3. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
    - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
    - b. Treat rough carpentry items as indicated .
    - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Treatment:
  - 1. Manufacturers:
    - a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
    - b. Koppers Performance Chemicals, Inc: www.koppersperformancechemicals.com.
    - c. Substitutions: See Section 01 6000 Product Requirements.
  - 2. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
    - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    - b. Treat lumber in contact with flashing or waterproofing.

- c. Treat lumber in contact with masonry or concrete.
- d. Treat lumber less than 18 inches above grade.
- e. Treat lumber in other locations as indicated.
- f. Treat lumber used for wood blocking within cavity wall construction..
- 3. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
  - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
  - b. Treat plywood in contact with flashing or waterproofing.
  - c. Treat plywood in contact with masonry or concrete.
  - d. Treat plywood less than 18 inches above grade.
  - e. Treat plywood in other locations as indicated.
  - f. Treat plywood used for wood blocking within cavity wall construction..

### PART 3 EXECUTION

- 3.01 INSTALLATION GENERAL
  - A. Select material sizes to minimize waste.
  - B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
  - C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

### 3.02 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific non-structural framing and blocking:
  - 1. Cabinets and shelf supports.
  - 2. Wall brackets.
  - 3. Handrails.
  - 4. Grab bars.
  - 5. Towel and bath accessories.
  - 6. Wall-mounted door stops.
  - 7. Chalkboards and marker boards.
  - 8. Wall paneling and trim.
  - 9. Joints of rigid wall coverings that occur between studs.
  - 10. TV and monitor mounts.

### 3.03 ROOF-RELATED CARPENTRY

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

### 3.04 INSTALLATION OF CONSTRUCTION PANELS

- A. Roof and Wall Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
  - 1. At long edges provide solid edge blocking where joints occur between roof framing members.
  - 2. Screw panels to framing; staples are not permitted.
- B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
- C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
  - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
  - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
  - 3. Install adjacent boards without gaps.

### 3.05 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.
- 3.06 CLEANING
  - A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
  - B. Prevent sawdust and wood shavings from entering the storm drainage system.

# **SECTION 06 2000**

# FINISH CARPENTRY

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Finish carpentry items.
  - 1. Custom plastic laminate and solid surfacing sales counters.
  - 2. Solid surfacing window stools.
  - 3. Standing and running wood trim.
  - 4. Hang doors, install hardware.
- B. Hardware and attachment accessories.
- 1.02 RELATED REQUIREMENTS
  - A. Section 06 1000 Rough Carpentry: Support framing, grounds, and concealed blocking.
  - B. Section 06 6500 Plastic Simulated Wood Trim: PVC panels and trim
  - C. Section 12 3600 Countertops, Backsplashes and Window Stools: Solid Surface material.
- 1.03 REFERENCE STANDARDS
  - A. ANSI A208.1 American National Standard for Particleboard; 2009.
  - B. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
  - C. AWI/AWMAC/WI (AWS) Architectural Woodwork Standards; 2014.
  - D. AWMAC/WI (NAAWS) North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
  - E. AWPA U1 Use Category System: User Specification for Treated Wood; 2012.
  - F. HPVA HP-1 American National Standard for Hardwood and Decorative Plywood; 2009.
  - G. NEMA LD 3 High-Pressure Decorative Laminates; 2005.
- 1.04 ADMINISTRATIVE REQUIREMENTS
  - A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.
  - B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

### 1.05 SUBMITTALS

- A. Product Data:
  - 1. Provide data on fire retardant treatment materials and application instructions.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- C. Samples: Plastic laminate for finish selection.
- D. Samples: Submit two samples of wood trim 12 inch long.
- E. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

### 1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
  - 1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
  - 2. Single Source Responsibility: Provide and install this work from single fabricator.
- B. Quality Certification:
  - 1. Provide labels or certificates indicating that the work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
  - 2. Provide designated labels on shop drawings as required by certification program.
  - 3. Provide designated labels on installed products as required by certification program.
  - 4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

### 1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

### PART 2 PRODUCTS

### 2.01 FINISH CARPENTRY ITEMS

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.
- C. Interior Woodwork Items:
  - 1. Window Stools: Solid Surface Material.
  - 2. Custom sales casework, plastic laminate finish, with solid surface counters and splashes..

### 2.02 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

### 2.03 LUMBER MATERIALS

- A. Hardwood Lumber: White Maple species, quarter sawn, maximum moisture content of 6 percent, of quality suitable for transparent finish.
- B. Hardwood Lumber: Poplar species, plain sawn, maximum moisture content of 6 percent, of quality suitable for opaque (painted) finish.

### 2.04 SHEET MATERIALS

- A. Hardwood Plywood: Face species White Maple, quarter cut, book matched, medium density fiberboard core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.
- B. Particleboard: ANSI A208.1; Composed of wood chips, sawdust, or flakes of medium density, made with waterproof resin binders; of grade to suit application; sanded faces.

### 2.05 PLASTIC LAMINATE MATERIALS

- A. Plastic Laminate: NEMA LD 3, HGS; color as selected by Architect; satin finish.
- B. Laminate Backing Sheet: NEMA LD 3, BKL; undecorated plastic laminate.
- C. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.

- 2.06 FASTENINGS
  - A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
  - B. Concealed Joint Fasteners: Threaded steel.
- 2.07 ACCESSORIES
  - A. Primer: as specified in Section 09 9000.
  - B. Wood Filler: Solvent base, tinted to match surface finish color.
- 2.08 WOOD TREATMENT
  - A. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
  - B. Wood Preservative by Pressure Treatment (PT Type): Provide AWPA U1 treatment using waterborne preservative with 0.25 percent retainage.
  - C. Shop pressure treat wood materials requiring fire rating to concealed wood blocking.
  - D. Provide identification on fire retardant treated material.
  - E. Redry wood after pressure treatment to maximum 10 percent moisture content.
- 2.09 FABRICATION
  - A. Shop assemble work for delivery to site, permitting passage through building openings.
  - B. Cap exposed plastic laminate finish edges with material of same finish and pattern.
  - C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
  - D. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
  - E. Apply laminate backing sheet to reverse face of plastic laminate finished surfaces.
- 2.10 SHOP FINISHING
  - A. Sand work smooth and set exposed nails and screws.
  - B. Apply wood filler in exposed nail and screw indentations.
  - C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
  - D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 Finishing for grade specified and as follows:
    - 1. Transparent:
      - a. System 11, Polyurethane, Catalyzed.
      - b. Sheen: Satin.
  - E. Back prime woodwork items to be field finished, prior to installation.

### PART 3 EXECUTION

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

### 3.02 INSTALLATION

- A. Hang doors and install hardware.
- B. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
- C. Set and secure materials and components in place, plumb and level.
- D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- E. Install interior wood trim with finish nails or finish screws, set for filler.
- F. Install solid surface window stools.

### 3.03 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply one coats of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

### 3.04 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Before installation, prime paint surfaces of wood items or assemblies to be in contact with cementitious materials.

### 3.05 TOLERANCES

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

### **SECTION 06 6500**

### PLASTIC SIMULATED WOOD TRIM

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Cellular PVC Trim Boards and Panels for:
  - 1. Cornices
  - 2. Soffits
  - 3. Fascia
  - 4. Battens
  - 5. Trim

### 1.02 RELATED SECTIONS

- A. Section 06 1000 Rough Carpentry: Blocking and substrates for PVC trim and panels.
- B. Section 06 20 00 Finish Carpentry.
- C. Section 07 9200 Joint Sealants

### 1.03 REFERENCES

- A. ASTM D 792 Density and Specific Gravity of Plastics by Displacement.
- B. ASTM D 570 Water Absorption of Plastics.
- C. ASTM D 638 Tensile Properties of Plastics.
- D. ASTM D 790 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- E. ASTM D 1761 Mechanical Fasteners in Wood.
- F. ASTM D 5420 Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by means of a Striker Impacted by a Falling Weight.
- G. ASTM D 256 Determining the Pendulum Impact Resistance of Plastics.
- H. ASTM D 696 Coefficient of Linear Thermal Expansion of Plastics Between minus 30 degrees C and plus 30 degrees C with a Vitreous Silica Dilatometer.
- I. ASTM D 635 Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
- J. ASTM E 84 Surface Burning Characteristics of Building Materials.
- K. ASTM D 648 Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
- L. ASTM D 3679 Standard Specification for Rigid Poly Vinyl Chloride (PVC) Siding.
- M. ASTM D 2240 Rubber Property Durometer Hardness
- N. ASTM D 3345 Standard Test Method for Laboratory Evaluation of Wood and Other Cellulosic Materials for Resistance to Termites.

### 1.04 SUBMITTALS

- A. Submit under provisions of Section 01 3000 Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.

- C. Verification Samples: For each product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and finish.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer with a minimum of 5 years producing PVC trim products.
- B. Installer Qualifications: Installer with a minimum of 3 years experience with the installation of PVC trim products.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Finish areas designated by Architect.
  - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
  - 3. Refinish mock-up area as required to produce acceptable work.
  - 4. Accepted mock-ups shall be comparison standard for remaining Work
  - 5. Coordinate with Mock-Up specified in Section 04 2000.

### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products on a flat and level surface on a full shipping pallet. Handle materials to prevent damage to product edges and corners.
- B. Store materials under a protective covering to prevent jobsite dirt and residue from collecting on the boards.
- 1.07 SEQUENCING
  - A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

### 1.08 PROJECT CONDITIONS

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

### 1.09 WARRANTY

A. Provide manufacturer's transferable limited lifetime warranty against defects in manufacturing that causes the products to rot, corrode, delaminate, or excessively swell from moisture.

### **PART 2 PRODUCTS**

### 2.01 MANUFACTURERS

- A. Basis of Design: AZEK Trimboards: www.azek.com
- B. Other Approved Manufacturers:
  - 1. Versatex: www.versatex.com
  - 2. Substitutions: See Section 01 6000: Materials and Equipment.
- 2.02 MATERIALS
  - A. PVC: Cellular PVC material with a small-cell microstructure and density of .55 grams/cm3.
  - B. Performance and physical characteristic requirements:
    - 1. Physical:
      - a. Density: 0.55 g/cm3when tested in accordance with ASTM D 792.

- b. Water Absorption: Less then 0.50 percent when tested in accordance with ASTM D 570
- 2. Mechanical:
  - a. Tensile Strength: 3582 psi when tested in accordance with ASTM D 638.
  - b. Tensile Modulus: 107,000 psi when tested in accordance with ASTM D 638.
  - c. Flexural Strength: 5179 psi when tested in accordance with ASTM D 790.
  - d. Flexural Modulus: 215,600 psi when tested in accordance with ASTM D 790.
  - e. Modulus of Elasticity: 209,500 psi when tested in accordance with ASTM D 638.
  - f. Elongation: 9.0 percent when tested in accordance with ASTM D 638.
  - g. Nail Hold: 398 lbf/in of penetration when tested in accordance with ASTM D 1761.
  - h. Compressive Strength: 6,553 psi (thickness dependent)
  - i. Compressive modulus: 2,305 lbf/in (thickness dependent)
  - j. Screw Hold: 240 lbf/in of penetration when tested in accordance with ASTM D 1761.
  - k. Staple Hold: 69 lbf/in of penetration when tested in accordance with ASTM D 1761.
  - 1. Gardner Impact: 34 In-lbs when tested in accordance with ASTM D 5420.
  - m. Notched Izod Impact: 0.270 Ft-lbs/inch when tested in accordance with ASTM D 256.
  - n. Termite Resistance: Rating of 10 as tested in accordance with ASTM D 3345.
  - o. Hardness: 60+ when tested in accordance with ASTM D 2240.
  - p. Parking Garage Ceiling Soffit System: 225 psf when tested in accordance with UL 580.
- 3. Thermal:
  - a. Coefficient of Linear Expansion: 3.25 x 10-5 in/in/degrees F when tested in accordance with ASTM D 696.
  - b. Burning Rate: Failed to Ignite when tested in accordance with ASTM D 635.
  - c. Flame Spread Index: 20 when tested in accordance with ASTM E 84.
  - d. Heat Deflection Temp (264 psi): 146 degrees F when tested in accordance with ASTM D 648.
  - e. Heat Deflection Temp (66 psi): 153 degrees F when tested in accordance with ASTM D 648.
  - f. Oil Canning (@ 140 degrees F: Passed when tested in accordance with ASTM D 648.
- 4. Manufacturing Tolerances:
  - a. Variation in component length: Minus 0.00 / plus 1.00.
  - b. Variation in component width: plus or minus 1/32 inch.
  - c. Variation in component thickness: plus or minus 1/32 inch.
  - d. Variation in component edge cut: plus or minus 2 degrees.
  - e. Variation in Density plus or minus 0.02 grams per cubic centimeter.
- 5. Workmanship, Finish, and Appearance:
  - a. Free Foam Cellular PVC that is homogeneous and free of voids, holes, cracks, foreign inclusions and other defects. Edges must be square and top and bottom surfaces shall be flat with no convex or concave deviation.
  - b. Uniform surface free from cupping, warping, and twisting.
- C. SIMULATED WOOD TRIM
  - 1. PVC Trimboard: Cellular Foam Trimboard with Sealed Edge.
    - a. Nominal Width: as shown
    - b. Nominal Thickness:

- 1) 1 inch (3/4 inch actual size)
- 2) 5/4 inch (1 inch actual size)
- c. Finish:
  - 1) Smooth/Smooth finish
- 2. Sheet Board: Cellular PVC S4S (Smooth) Sheet. For use as sheet materials or to create columns and gingerbread millwork.
  - a. Size: as shown.
  - b. Thickness:
    - 1) 3/4 inch
  - c. Finish:
    - 1) Smooth/Smooth finish
  - d. Soffits: Vented.
- D. ACCESSORIES
  - 1. Fasteners:
    - a. Use 12 gauge stainless steel fasteners designed for wood trim and siding. Fastener should have sufficient flexural and tensile strength to resist bending.
    - b. Use fasteners with thin shanks, blunt points, and full round heads that are long enough to penetrate the substrate a minimum of 1-1/4 inches.
    - c. Do not use staples, small brads and wire nails. Avoid using fine threaded wood screws and ring-shank fasteners.
    - d. Use standard nail guns with a pressure setting between 70 psi and 100 psi. The recommended pressure depends on the type of gun, type of nail, ambient temperature, and the substrate. Care should be taken not to overdrive the nail into the material.
    - e. Pre-drilling is not typically required unless large fasteners are used or the product is installed during temperatures below 40 degrees F.
    - f. Use two fasteners for every framing member for trimboard applications. Sheet and trimboards 8 inches and wider require additional fasteners.
    - g. Install fasteners no more than 2 inches from the end of each board.
    - h. Avoid fastening simulated wood trim over hollow or uneven areas. Fasten onto flat, solid substrates.
  - 2. Adhesives: Finishing System.
    - a. All bonded surfaces must be smooth, clean, and in complete contact with each other for best results.
    - b. Adhere simulated wood trim to itself with PVC cement or cellular PVC adhesives to prevent joint separation. Acceptable adhesives are PVC Trim Welder, IPS Weld-On 705 (white), and Zevo PVC Trim adhesive.
    - c. Scarf cut joints are recommended where applicable.
    - d. Bonded joints should be secured with fasteners and fastened with two rows on each side of the joint.
    - e. When bonding simulated wood trim to other substrates, consult the adhesive manufacturer to determine suitability.
  - 3. Nail Hole Filler: Cortex plug system by Fasten Master.
  - 4. Sealants:
    - a. Use polyurethane, polymer blends or acrylic based sealants that do not contain silicone as specified in Section 07 9200 Joint Sealers.

# PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Do not begin installation until substrates have been properly prepared.
  - B. Notify Architect of unsatisfactory preparation before proceeding.
- 3.02 PREPARATION
  - A. Clean surfaces thoroughly prior to installation.
  - B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- 3.03 INSTALLATION
  - A. Install in accordance with manufacturer's instructions.
  - B. Cutting:
    - 1. Simulated wood trim can be cut using standard woodworking saws. Conventional carbide-tipped blades designed for cutting wood are preferred. Avoid using fine-tooth metal-cutting blades.
    - 2. Rough-cut edges are typically caused by excessive friction, poor board support, or worn or improper tooling.
  - C. Drilling:
    - 1. Simulated wood trim can be drilled using standard woodworking drill bits. Do not use drill bits made for rigid PVC.
    - 2. Avoid frictional heat build-up.
    - 3. Remove shavings periodically from a drill hole as necessary.
  - D. Milling and Moulding:
    - 1. Simulated wood trim can be milled or moulded using standard milling or moulding machines found in millwork shops.
    - 2. Rake angle 20 to 30 degrees. 25 degrees is recommended.
    - 3. Cutting speed to be optimized with the number of knives and feed rate.
  - E. Routing:
    - 1. Simulated wood trim can be routed with virtually any piece of equipment used to rout wood.
    - 2. Carbide tipped router bits are recommended.
    - 3. Machinery that allows for multiple cutting speeds will allow you to optimize the process obtaining a smoother finished part.
  - F. Edge Finishing:
    - 1. Traditional sanding, grinding or filing tools used for woodworking are preferred.
  - G. Nail Location:
    - 1. For trimboard applications use two fasteners per framing member.
    - 2. Use additional fasteners (3/4 inch preferred) for trimboard 8 inches and wider.
    - 3. Install fasteners a maximum of 2 inches from the end of each board.
  - H. Expansion and Contraction:
    - 1. Simulated wood trim expands and contracts with changes in temperature. Properly fastening along the entire length is required to minimize expansion and contraction.
    - 2. Allow 3/16 inch space per 18-foot run of trim for expansion and contraction.
    - 3. Bond joints between pieces of simulated wood trim to eliminate separation.
    - 4. Allow expansion and contraction space at the ends of long runs.

### 3.04 CLEANING:

- A. Clean simulated wood trim with mild detergent and water, in accordance with manufacturers instructions.
- B. Products with pumice, such as Soft Scrub, may be applied with a nylon brush.
- C. For more stubborn stains use a mild household cleaner and degreaser.

### 3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.
# **SECTION 07 1113**

# **BITUMINOUS DAMPPROOFING**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Bituminous dampproofing.
- B. Protection boards.
- C. Drainage panels.

## 1.02 REFERENCE STANDARDS

- A. ASTM D41/D41M Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011 (Reapproved 2016).
- B. ASTM D1187/D1187M Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2011).
- C. ASTM D1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013.

1.03 SUBMITTALS

- A. Product Data: Provide properties of primer, bitumen, and mastics.
- B. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- 1.04 QUALITY ASSURANCE
  - A. Installer Qualifications: Company specializing in performing the work of this section with at least three years of experience.

#### 1.05 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

## PART 2 PRODUCTS

- 2.01 BITUMINOUS DAMPPROOFING
  - A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
    - 1. Composition Vertical Application: ASTM D1227 Type III or ASTM D1187/D1187M Type I.
    - 2. VOC Content: Not more than permitted by local, State, and federal regulations.
    - 3. Applied Thickness: 1/16 inch, minimum, wet film.
    - 4. Products:
      - a. W. R. Meadows, Inc; Sealmastic Emulsion Type I (spray-grade): www.wrmeadows.com/sle.
      - b. Substitutions: See Section 01 6000 Product Requirements.
  - B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

## 2.02 BITUMEN MATERIALS

- A. Cold Asphaltic Type:
  - 1. Bitumen: Emulsified asphalt, ASTM D1227;unreinforced (Type III).

2. Asphalt Primer: ASTM D41/D41M, compatible with substrate.

## 2.03 ACCESSORIES

- A. Drainage Panel: 1/4 inch thick formed plastic, hollowed sandwich.
- B. Protection Board: 1/8 inch thick biodegradable hardboard.

## PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify existing conditions are acceptable prior to starting this work.
  - B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.
  - C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

### 3.02 PREPARATION

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not apply dampproofing to surfaces unacceptable to manufacturer.
- D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

### 3.03 APPLICATION

- A. Foundation Walls: Apply two coats of asphalt dampproofing.
- B. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- C. Prime surfaces at a rate approved by manufacturer for application indicated, and allow primer to dry thoroughly.
- D. Apply bitumen by spray application.
- E. Apply bitumen in one coat, continuous and uniform, at a rate of 25 sq ft/gal per coat.
- F. Apply from 2 inches below finish grade elevation, or below first course of face brick, down to top of grade beam at locations where two or more CMU courses are below grade.
- G. Seal items watertight with mastic, that project through dampproofing surface.
- H. Place drainage panel directly over dampproofing, butt joints, place to encourage drainage downward.
- I. Place protection board over drainage panel, butt joints, and adhere with mastic.
- J. Scribe and cut boards around projections, penetrations, and interruptions.

# SECTION 07 2100 THERMAL INSULATION

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Board insulation at perimeter foundation wall.
- B. Batt insulation in exterior wall construction.
- C. Spray foam insulation in exterior wall construction.
- D. Acoustical insulation in interior acoustically rated partitions.
- E. Fire safing insulation at fire partitions and perimeter firestopping at curtain walls.

#### 1.02 RELATED REQUIREMENTS

- A. Section 07 2640 Spray Polyurethane Foam Insulating Air Barrier: Plastic foam insulation other than boards.
- B. Section 07 5300 Elastomeric Membrane Roofing: Insulation specified as part of roofing system.

### 1.03 REFERENCE STANDARDS

- A. ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- B. ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2016.
- C. ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
- D. ASTM C665 Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- E. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

#### 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
- F. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- G. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

#### 1.05 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:
  - 1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
  - 2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.
- 1.06 FIELD CONDITIONS
  - A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

## PART 2 PRODUCTS

### 2.01 APPLICATIONS

- A. Insulation types are:
  - 1. Type 1 Batt/blanket insulation unfaced.
  - 2. Type 2 Batt/blanket insulation with vapor barrier (NOT USED).
  - 3. Type 3 Perimeter insulation rigid.
  - 4. Type 4 Cavity wall insulation rigid.
  - 5. Type 4A Cavity wall insulation mineral fiber
  - 6. Type 5 Acoustical insulation.
  - 7. Type 6 Fire safing insulation.
  - 8. Type 7 Spray polyurethane foam insulation.
- B. Insulation Type 3 at Perimeter of Foundation: Extruded polystyrene board.
- C. Insulation Type 7 inside Masonry Cavity Walls (Typical): Spray Polyurethane Foam, Refer to Section 07 2640.
- D. Insulation Type 7 over sheathing and metal stud framed walls, continuous (Typical): Spray Polyurethane Foam, Refer to Section 07 2640.
- E. Insulation Type 4A where indicated Exterior Walls: Mineral Fiber
- F. Acoustical Insulation Type 5 in sound rated partitions.
- G. Fire safing insulation Type 6 at voids and penetrations of fire separations and smoke walls.1. For terminations of rated CMU partitions to deck above.
- H. Ventilated composite roof insulation.
  - 1. Refer to Section 07 3113 for asphalt shingle steep sloped roofs.
  - 2. Refer to Section 07 4113 for sheet metal roofs.

## 2.02 FOAM BOARD INSULATION MATERIALS

- A. Type 3 and Type 4: Extruded Polystyrene Board Insulation: Extruded polystyrene board; ASTM C578; with either natural skin or cut cell surfaces, and the following characteristics:
  - 1. Type: ASTM C578, Type VI.
  - 2. Flame Spread Index (FSI): Class A 0 to 25, when tested in accordance with ASTM E84.
  - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
  - 4. R-value; 1 inch of material at 72 degrees F: 5, minimum.
  - 5. Board Edges: Square.
  - 6. Water Absorption, Maximum: 0.3 percent, by volume.
  - 7. Manufacturers:

- a. Dow Chemical Company; STYROFOAM HIGHLOAD 40: www.dow.com/#sle.
- b. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/#sle.
- c. Substitutions: See Section 01 6000 Product Requirements.

## 2.03 FIBER BOARD INSULATION MATERIALS

- A. Mineral Fiber Board Cavity Insulation Type 4A:
  - 1. Manufacturer: Roxul CavityRock DD
  - 2. Type: mineral wool fiber insulation board.
  - 3. Edges: square.
  - 4. Size: 16" x 48".
  - 5. Thickness: as shown on drawings.
  - 6. Thermal resistivity (r-value): 4.3 per inch thickness per ASTM C 518.
  - 7. Water vapor permeance: 27.2 perm per ASTM E 96.
  - 8. ASTM compliance: ASTM C 612 Type IVB.
- B. Mineral Fiber Board Insulation Type 6: Rigid or semi-rigid mineral fiber, ASTM C612 or ASTM C553; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
  - 1. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
  - 2. Manufacturers:
    - a. ROXUL, Inc; CURTAINROCK 80: www.roxul.com/#sle.
    - b. ROXUL, Inc; CURTAINROCK 40: www.roxul.com/#sle.
    - c. ROXUL, Inc; ROXUL SAFE 65: www.roxul.com/#sle.

### 2.04 BATT INSULATION MATERIALS

- A. Type 1 and Type 5 Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
  - 1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
  - 2. Manufacturers:
    - a. Johns Manville; MinWool Sound Attenuation Fire Batts: www.jm.com/#sle.
    - b. Thermafiber, Inc; SAFB: www.thermafiber.com/#sle.
    - c. ROXUL, Inc; ROXUL AFB: www.roxul.com/#sle.

#### 2.05 ACCESSORIES

- A. Insulation Fasteners: Impaling clip of nylon with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.
- B. Adhesive: Type recommended by insulation manufacturer for application.

## PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
  - B. Verify substrate surfaces are flat, free of irregularities or materials or substances that may impede adhesive bond.

#### 3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Install boards vertically and/or horizontally on foundation perimeter as shown.

- 1. Place boards to maximize adhesive contact.
- 2. Install in running bond pattern.
- 3. Butt edges and ends tightly to adjacent boards and to protrusions.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

## 3.03 BOARD INSTALLATION AT CAVITY WALLS

- A. Install boards horizontally on walls.
  - 1. Place boards to maximize adhesive contact.
  - 2. Butt edges and ends tightly to adjacent boards and to protrusions.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

### 3.04 BATT INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

### 3.05 FIELD QUALITY CONTROL

- A. Coordination of Air Barrier Association of America (ABAA) Tests and Inspections:
  - 1. Provide testing and inspection required by ABAA Quality Assurance Program (QAP).
  - 2. Notify in ABAA writing of schedule for air barrier work, and allow adequate time for testing and inspection.
  - 3. Cooperate with ABAA testing agency.
  - 4. Allow access to air barrier work areas and staging.
  - 5. Do not cover air barrier work until tested, inspected, and accepted.

#### 3.06 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

## **SECTION 07 2400**

#### **EXTERIOR INSULATION AND FINISH SYSTEMS**

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Soffit Vents and Control Joints.
- B. Composite wall and soffit cladding of rigid insulation and reinforced finish coating over cementitious base coat ("Class PM").

#### 1.02 RELATED REQUIREMENTS

- A. Section 07 6200 Sheet Metal Flashing and Trim: Perimeter flashings.
- B. Section 07 9200 Joint Sealants: Sealing joints between EIFS and adjacent construction and penetrations through EIFS.
- C. Section 09 2116 Gypsum Board Assemblies: Cement Board substrates.

### 1.03 REFERENCE STANDARDS

- A. ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus; 2016.
- B. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- C. ASTM B221M Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- D. ASTM C150/C150M Standard Specification for Portland Cement; 2015.
- E. ASTM C1397 Standard Practice for Application of Class PB Exterior Insulation and Finish Systems (EIFS) and EIFS with Drainage; 2013.
- F. ASTM D968 Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive; 2015.
- G. ASTM D2247 Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity; 2015.
- H. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- I. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- J. ASTM G153 Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.
- K. ASTM G155 Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.
- L. ICC-ES AC219 Acceptance Criteria for Exterior Insulation and Finish Systems; 2009.
- M. ICC-ES AC235 Acceptance Criteria for EIFS Clad Drainage Wall Assemblies; 2004 (Editorially revised 2009).
- N. NFPA 268 Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source; 2012.
- O. NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

### 1.04 SUBMITTALS

- A. Product Data: Provide data on system materials, product characteristics, performance criteria, and system limitations.
- B. Selection Samples: Submit manufacturer's standard range of samples illustrating available coating colors and textures.
- C. Verification Samples: Submit actual samples of selected coating on specified substrate, minimum 12 inches square, illustrating project colors and textures.
- D. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, and jointing requirements.

### 1.05 QUALITY ASSURANCE

- A. Maintain copy of specified installation standard and manufacturer's installation instructions at project site during installation.
- B. EIFS Manufacturer Qualifications: Provide EIFS products other than insulation from the same manufacturer with qualifications as follows:
  - 1. Manufacturer of EIFS products for not less than 5 years.
- C. Installer Qualifications: Company specializing in the type of work specified and with at least three years of documented experience and approved by manufacturer.

### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to project site in manufacturer's original, unopened containers with labels intact. Inspect materials and notify manufacturer of any discrepancies.
- B. Storage: Store materials as directed by manufacturer's written instructions.

## 1.07 FIELD CONDITIONS

- A. Do not prepare materials or apply EIFS under conditions other than those described in the manufacturer's written instructions.
- B. Do not prepare materials or apply EIFS during inclement weather unless areas of installation are protected. Protect installed EIFS areas from inclement weather until dry.
- C. Do not install coatings or sealants when ambient temperature is below 40 degrees F.
- D. Do not leave installed insulation board exposed to sunlight for extended periods of time.

## 1.08 WARRANTY

- A. See Section 01 7800 Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's standard material warranty, covering a period of not less than 5 years.

## PART 2 PRODUCTS

## 2.01 MANUFACTURERS

- A. Manufacturers:
  - 1. Basis of Design: Dryvit Systems, Inc; Dryvit Textured Acrylic Finish System (TAFS) Option 2; www.dryvit.com.

## 2.02 EXTERIOR INSULATION AND FINISH SYSTEM

A. Exterior Insulation and Finish System: Base coat, reinforcing mesh, acrylic primer and acrylic finish coating on flat-backed insulation board adhesive-applied directly to water-resistive coating substrate; provide a complete system that has been tested to show compliance with the following characteristics; include all components of specified system and substrate(s) in tested samples.

- B. Fire Characteristics:
  - 1. Flammability: Pass, when tested in accordance with NFPA 285.
  - 2. Ignitibility: No sustained flaming when tested in accordance with NFPA 268.
- C. Water Penetration Resistance: No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes, when tested in accordance with ASTM E331 at 6.24 psf differential pressure with tracer dye in the water spray; include in tested sample at least two vertical joints and one horizontal joint of same type to be used in construction; disassemble sample if necessary to determine extent of water penetration.
- D. Salt Spray Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 300 hours exposure in accordance with ASTM B117, using at least three samples matching intended assembly, at least 4 by 6 inches in size.
- E. Freeze-Thaw Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 10 cycles, when tested in accordance with ICC-ES AC219 or ICC-ES AC235.
- F. Weathering Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 2000 hours of accelerated weathering conducted in accordance with ASTM G153 Cycle 1 or ASTM G155 Cycle 1, 5, or 9.
- G. Water Degradation Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 14 days exposure, when tested in accordance with ASTM D2247.
- H. Mildew Resistance: No growth supported on finish coating during 28 day exposure period, when tested in accordance with ASTM D3273.
- I. Abrasion Resistance Of Finish: No cracking, checking or loss of film integrity when tested in accordance with ASTM D968 with 113.5 gallons of sand.

#### 2.03 MATERIALS

- A. Finish Coating Top Coat: Water-based, air curing, acrylic or polymer-based finish with integral color and texture.
  - 1. Texture: Dryvit Systems, Inc, Standard Textures, with Dirt Pickup Resistance; Sandpebble Fine DPR; www.dryvit.com/#sle.
- B. Primer
  - 1. Color Prime: Pigmented, acrylic based primer used to improve adhesion and uniformity of finish color.
- C. Base Coat: Polymer-modified, fiber reinforced Portland cement coating.
  - 1. Portland Cement: ASTM C150/C150M, Type I or II.
  - 2. Base Coat Thickness: 1/4 inch, minimum.
  - 3. Manufacturers:
    - a. Dryvit Primus or Genesis.
    - b. Substitutions: See Section 01 6000 Product Requirements.
- D. Reinforcing Mesh: Balanced, open weave glass fiber fabric, treated for compatibility and improved bond with coating, weight, strength, and number of layers as required to meet required system impact rating.
- E. Water-Resistive Barrier Coating: Fluid-applied air and water barrier membrane; applied to sheathing; furnished or approved by EIFS manufacturer.

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#### 2.04 ACCESSORY MATERIALS

- A. Metal Flashings: As specified in Section 07 6200.
- B. Trim: EIFS manufacturer's standard PVC or galvanized steel trim accessories, as required for a complete project and including starter track and drainage accessories.
- C. Sealant Materials: Compatible with EIFS materials and as recommended by EIFS manufacturer.
- D. Exterior Soffit Vents: One piece, perforated, ASTM B221 (ASTM B221M), 6063 alloy, T5 temper, aluminum, with plaster or EIFS edge and manufactured especially for soffit application. Provide continuous vent.
  - 1. Size: 3"
  - 2. Fry Reglet Model DRM-625-V-300.
  - 3. Substitutions: See Section 01 6000 Product Requirements.

## PART 3 EXECUTION

- 3.01 GENERAL
  - A. Install in accordance with EIFS manufacturer's instructions and ASTM C1397.
  - B. Where different requirements appear in either document, comply with the most stringent.
  - C. Neither of these documents supercedes the provisions of the Contract Documents that define the contractual relationships between the parties or the scope of work.

### 3.02 EXAMINATION

- A. Verify that substrate is sound and free of oil, dirt, other surface contaminants, efflorescence, loose materials, or protrusions that could interfere with EIFS installation and is of a type and construction that is acceptable to EIFS manufacturer. Do not begin work until substrate and adjacent materials are complete and thoroughly dry.
- B. Verify that substrate surface is flat, with no deviation greater than 1/4 in when tested with a 10 ft straightedge.

#### 3.03 INSTALLATION - WATER-RESISTIVE BARRIER

- A. Apply barrier coating as recommended by coating manufacturer; prime substrate as required before application.
- B. Seal substrate transitions and intersections with other materials to form continuous water-resistive barrier on exterior of sheathing, using method recommended by manufacturer.
- C. At door and window rough openings and other wall penetrations, seal water-resistive barrier and flexible flashings to rough opening before installation of metal flashings, sills, or frames, using method recommended by manufacturer.
- D. Lap flexible flashing or flashing tape at least 2 inches on each side of joint or transition.
- E. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations indicated on the drawings. Provide vent area indicated on drawings.

## 3.04 INSTALLATION - FINISH

- A. Joints: Install control joints at spacings indicated on the drawings. Do not exceed 400 sq ft for areas defined by the placement of control joints.
- B. Base Coat: Apply in thickness as necessary to fully embed reinforcing mesh, wrinkle free, including back-wrap at terminations of EIFS. Install reinforcing fabric as recommended by EIFS manufacturer.
  - 1. Lap reinforcing mesh edges and ends a minimum of 2-1/2 inches.

- 2. Allow base coat to dry a minimum of 24 hours before next coating application.
- C. Apply primer and finish coat after base coat has dried not less than 24 hours, embed finish aggregate, and finish to a uniform texture and color.
- D. Finish Coat Thickness: As recommended by manufacturer.
- E. Seal control and expansion joints within the field of exterior finish and insulation system, using procedures recommended by sealant and finish system manufacturers.

#### 3.05 CLEANING

A. Clean EIFS surfaces and work areas of foreign materials resulting from EIFS operations.

### 3.06 PROTECTION

A. Protect completed work from damage and soiling by subsequent work.

# SECTION 07 2500 WEATHER BARRIERS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Vapor Retarders: Materials to make exterior walls, joints between exterior walls and roof, joints around frames of openings in exterior walls, and roof assemblies water vapor resistant and air tight.
- B. Air Barriers: Materials that form a system to stop passage of air and water vapor through exterior walls, joints between exterior walls and roof, joints around frames of openings in exterior walls, and roof assemblies.

#### 1.02 RELATED REQUIREMENTS

- A. Section 07 2640 Spray Polyurethane Foam Insulating Air Barrier: Air barrier and insulation systems
- B. Section 07 2616 Underslab Vapor Barrier/Retarder.
- C. Section 076200 Sheet Metal Flashing and Trim: Membrane flashings installed in conjunction with weather barriers.
- D. Section 09 2116 Gypsum Board Assemblies: Water-resistive barrier under exterior cladding.

### 1.03 DEFINITIONS

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: Air tight barrier made of material that is relatively air impermeable <u>and</u> water vapor impermeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, air barriers that also function as vapor retarders are are classified as air barriers.
- C. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture-resistant, to the degree specified, intended to be installed to shed water, with sealed seams.

#### 1.04 REFERENCE STANDARDS

- A. AATCC Test Method 127 Water Resistance: Hydrostatic Pressure Test; 2014.
- B. ASTM D1970/D1970M Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
- C. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- D. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- E. ASTM E2178 Standard Test Method for Air Permeance of Building Materials; 2013.
- F. ICC-ES AC38 Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc; 2013.

#### 1.05 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics.
- C. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

#### 1.06 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

## PART 2 PRODUCTS

## 2.01 WEATHER BARRIER ASSEMBLIES

- A. Water-Resistive Barrier: Provide on exterior walls under exterior cladding.
  1. Use water-resistive barrier sheet, mechanically fastened unless otherwise indicated.
- B. Air Barrier:
  - 1. On outside surface of inside wythe of exterior masonry cavity walls use spray polyurethane foam insulating air barrier.
  - 2. On outside surface of gypsum sheathing of exterior walls where Spray Polyurethane Foam Insulating Air Barrier is not indicated, use vapor permeable air barrier sheet, self-adhesive type.
  - 3. On outside surface of roof decking under composite insulation at asphalt shingles and metal roofing, use vapor retarder air barrier sheet, self-adhesive type.

## 2.02 WATER-RESISTIVE BARRIER MATERIALS

- A. Water-Resistive Barrier Sheet, Mechanically Fastened:
  - 1. Air Permeance: 0.004 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
  - 2. Water Vapor Permeance: 5 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant procedure).
  - 3. Water Penetration Resistance: Withstand a water head of 21 inches, minimum, for minimum of 5 hours, when tested in accordance with AATCC Test Method 127.
  - 4. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 180 days of weather exposure.
  - 5. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84.
  - 6. Water Resistance: Comply with applicable water-resistive requirements of ICC-ES AC38.
  - 7. Products:
    - a. DuPont Building Innovations; Tyvek Commercial Wrap D with FlexWrap NF, StraightFlash, StraightFlash VF, and Tyvek Tape: www.dupont.com.
    - b. HardieWrap, HardieWrap Seam Tape, HardieWrap Flex Flashing: www.jameshardie.com.
    - c. Substitutions: See Section 01 6000 Product Requirements.

# 2.03 AIR BARRIER MATERIALS (AIR BARRIER, VAPOR PERMEABLE, AND WATER-RESISTIVE)

- A. Air Barrier Sheet (Walls): ASTM D1970.
  - 1. Type: Self-adhered vapor permeable, water resistive air barrier consisting of a reinforced, modified polyolefin tri-laminate film surface and patented permeable adhesive technology with split-back poly-release film.
  - 2. Thickness: 23 mil, nominal.
  - 3. Water Vapor Permeance: 29 perm, maximum, when tested in accordance with ASTM E96/E96M.
  - 4. Air Permeance: Pass (0.02 L/s/sq m), maximum, when tested in accordance with ASTM E2178.

- 5. Products:
  - a. Henry Company; Blueskin VP 160: www.henry.com/sle..
  - b. Substitutions: See Section 01 6000 Product Requirements.

# 2.04 AIR BARRIER MATERIALS (AIR BARRIER, VAPOR RETARDER, AND WATER-RESISTIVE)

- A. Air Barrier Sheet (Roofs): ASTM D1970.
  - 1. Type: Modified bitumen membrane reinforced with skid-resistant polyethylene film, self-adhesive.
  - 2. Thickness: 40 mil (0.040 inch), nominal.
  - 3. Water Vapor Permeance: 0.05 perm, maximum, when tested in accordance with ASTM E96/E96M.
  - 4. Air Permeance: 0.004 cubic feet per minute per square foot (0.02 L/s/sq m), maximum, when tested in accordance with ASTM E2178.
  - 5. Products:
    - a. Henry Company; Blueskin RF200: www.henry.com.
    - b. Substitutions: See Section 01 6000 Product Requirements.

#### 2.05 SEALANTS

- A. Primers, Cleaners, and Other Sealant Materials: As recommended by sealant manufacturer, appropriate to application, and compatible with adjacent materials.
- 2.06 ACCESSORIES
  - A. Pre-formed Transition Membrane: Semi-rigid silicone composition, tapered edges, tear resistant.
  - B. Thinners and Cleaners: As recommended by material manufacturer.

#### PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that surfaces and conditions are ready to accept the work of this section.
- 3.02 PREPARATION
  - A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
  - B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's instructions.
- 3.03 INSTALLATION
  - A. Install materials in accordance with manufacturer's instructions.
  - B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
  - C. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
  - D. Mechanically Fastened Sheets On Exterior:
    - 1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
    - 2. Overlap seams as recommended by manufacturer but at least 6 inches.
    - 3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.

- 4. Attach to framed construction with fasteners extending through sheathing into framing. Space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.
- 5. For applications specified to be air tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape.
- 6. Install air barrier and vapor retarder UNDER jamb flashings.
- 7. Install head flashings under weather barrier.
- 8. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.
- E. Self-Adhesive Sheets:
  - 1. Prepare substrate in manner recommended by sheet manufacturer; fill and tape joints in substrate and between dissimilar materials.
  - 2. Lap sheets shingle-fashion to shed water and seal laps air tight.
  - 3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that all laps are firmly adhered with no gaps or fishmouths.
  - 4. Use same material, or other material approved by sheet manufacturer for the purpose, to seal to adjacent construction and as flashing.
  - 5. At wide joints, provide extra flexible membrane allowing joint movement.
- F. Openings and Penetrations in Exterior Weather Barriers:
  - 1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
  - 2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches wide; do not seal sill flange.
  - 3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
  - 4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
  - 5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
  - 6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

## 3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 Quality Requirements, for additional requirements.
- B. Do n ot cover installed weather barriers until required inspections have been completed.
- C. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

## 3.05 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

## **SECTION 07 2616**

## **UNDERSLAB VAPOR BARRIER/RETARDER**

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Vapor Barrier, seam tape, mastic, pipe boots, detail strip for installation under concrete slabs.
- 1.02 RELATED SECTIONS
  - A. Section 03 3000 Cast-in-Place Concrete

### 1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM)
  - 1. ASTM E 1745-97(2004) Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
  - 2. ASTM E 154-99(2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
  - 3. ASTM E 96-05 Standard Test Methods for Water Vapor Transmission of Materials
  - 4. ASTM E 1643-98(2005) Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

## 1.04 SUBMITTALS

- A. Quality Control / Assurance
  - 1. Independent laboratory test results showing compliance with ASTM & ACI Standards.
  - 2. Manufacturer's samples, literature
  - 3. Manufacturer's installation instructions for placement, seaming and pipe boot installation

## **PART 2 - PRODUCTS**

## 2.01 MATERIALS

- A. Vapor Barrier
  - 1. Vapor Barrier must have the following qualities
    - a. Perm rating less than or equal to 0.01 perms (grains/(ft2 \*hr \* in. Hg)) after conditioning as tested by:
      - 1) ASTM E 96
      - 2) ASTM E 1745 Class A (Plastics), paragraph 7.1.2-5.
- B. Vapor Barrier Products: 15 mil plastic sheet single ply vapor barrier.
  - 1. Stego Wrap (15 mil) Vapor Barrier by STEGO INDUSTRIES LLC, San Clemente, CA (877) 464-7834 www.stegoindustries.com
  - 2. Griffolyn 15 mil Green Vapor Barrier by Reef Industries, Inc.
  - 3. VaporBlock 15 by Raven Industries, Inc.
  - 4. ACCESSORIES
    - a. Seam Tape
      - 1) Tape must have the following qualities:
        - (a) Water Vapor Transmission Rate ASTM E 96: 0.3 perms or lower
    - b. Vapor Proofing Mastic
      - 1) Mastic must have the following qualities:
        - (a) Water Vapor Transmission Rate ASTM E 96: 0.3 perms or lower
    - c. Pipe Boots

1) Provide manufacturer's supplied pipe boot system or construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.

## **PART 3 - EXECUTION**

- 3.01 PREPARATION
  - A. Ensure that subsoil is approved by architect or geotechnical firm
    - 1. Level and tamp or roll aggregate, sand or tamped earth base.
- 3.02 INSTALLATION
  - A. Install Vapor Barrier/Retarder:
    - 1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
  - B. Unroll Vapor Barrier/Retarder with the longest dimension parallel with the direction of the pour.
  - C. Lap Vapor Barrier/Retarder over footings and seal to foundation walls.
  - D. Overlap joints 6 inches and seal with manufacturer's tape.
  - E. Seal all penetrations (including pipes) per manufacturer's instructions.
  - F. No penetration of the Vapor Barrier/Retarder is allowed except for reinforcing steel and permanent utilities.
  - G. Repair damaged areas by cutting patches of Vapor Barrier/Retarder, overlapping damaged area 6 inches and taping all four sides with tape.

## **SECTION 07 2640**

#### SPRAY POLYURETHANE FOAM INSULATING AIR BARRIER

#### PART 1 - GENERAL

- 1.01 SECTION INCLUDES
  - A. This section includes the following:
    - 1. Materials and installation to bridge and seal the following air leakage pathways and gaps:
      - a. Connections of the walls to the roof air barrier.
      - b. Connections of the walls to the foundations.
      - c. Openings and penetrations of window frames.
      - d. Barrier envelope systems.
      - e. Door frames.
      - f. Piping, conduit, duct and similar penetrations
      - g. Masonry ties, screws, bolts and similar penetrations.
      - h. All other air leakage pathways in the building envelope.

#### 1.02 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

- A. Sheet metal flashings to be built into masonry are furnished under Section 07 62 00.
- 1.03 RELATED SECTIONS
  - A. Section 04 2000 Unit Masonry:
  - B. Section 07 2100 Building Insulation.
  - C. Section 07 9200 Joint Sealants: Joint sealant materials and installation.
  - D. Section 08 11 13- Door frames.
  - E. Section 08 43 13 Aluminum storefronts and entrances

#### 1.04 PERFORMANCE REQUIREMENTS

- A. Provide air/vapor barrier system constructed to perform as follows:
  - 1. A continuous air/vapor barrier system.
  - 2. Building thermal insulation.
- B. System shall accommodate movements of building materials by providing expansion and control joints as required, with accessory air seal materials at such locations, changes in substrate and perimeter conditions.
- C. Maximum Permissible Air Leakage Rates cfm/sf @ 0.3" w.g. (l/s.m2 @ 75 Pa) 1. 0.02 (0.1)

#### 1.05 SUBMITTALS

- A. Provide submittals in accordance with Section 01 3000.
- B. Submit shop drawings showing locations and extent of air/vapor barrier and details of all typical conditions, intersections with other envelope systems and materials, membrane flashings and counter-flashings, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated and how miscellaneous penetrations such as conduits, pipes electric boxes and the like are sealed.
- C. Submit manufacturer's product data sheets for each type of material, including manufacturer's printed instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.
- D. Submit manufacturer's installation instructions.

- E. Provide evidence of testing by an accredited laboratory confirming material has been tested and conforms to the requirements of ASTM E2178, Standard for Air Barrier Materials.
- F. Certification by air/vapor barrier manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- G. Certification of compatibility by air/vapor barrier manufacturer, listing all materials on the project that it connects to or that come in contact with it.
- H. Submit two samples, 12 by 12 inch (300 by 300 mm) minimum size, of each air/vapor barrier material required for Project.
- I. Submit test results of air permeability testing of primary air barrier material (ASTM E 2178-01).
- J. Provide evidence of testing by an accredited laboratory confirming material has been tested and conforms to the requirements of ASTM E2357, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies: Pass.
- K. Provide evidence of testing by an accredited laboratory confirming material has been tested and conforms to the requirements of NFPA 285: Pass.
- L. Quality Assurance Program: Submit evidence of current accreditation and certification under the Air Barrier Association of America's (ABAA) Quality Assurance Program. Submit accreditation number of manufacturer and certification number of installers at time of submittal.

## 1.06 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Each worker who is installing air barriers must be either a Certified Applicator or an installer who is registered with ABAA
  - 2. Each Lead Certified Applicator can supervise a maximum of five registered installers. The Certified Applicator shall be thoroughly trained and experienced in the installation of air barriers of the types being applied. Lead Certified Applicators shall perform or directly supervise all air/vapor barrier work on the project.
  - 3. Installers shall also be certified by ABAA/NECA (National Energy Conservation Association) and PSDI (Professional Skills Development Institute for energy conservation) and SPFA (Spray Polyurethane Foam Alliance as foam mechanics). Installers shall have their photo-identification certification cards in their possession and available on the project site, for inspection upon request.
  - 4. Provide products that comply with all state and local regulations controlling use of volatile organic compounds (VOCs).
  - 5. Preconstruction Meeting: Convene one week prior to commencing Work of this section, in accordance with Section 01 20 00 Project Meetings.
  - 6. Field-Constructed Mock-Ups: Prior to installation of air/vapor barrier, apply air/vapor barrier as follows to verify details under shop drawing submittals and to demonstrate tie-ins with adjoining construction, and other termination conditions, as well as qualities of materials and execution:
    - a. Apply air/vapor barrier in field-constructed mock-ups of assemblies specified in Section 04 2000.
  - 7. Cooperate and coordinate with the Owner's inspection and testing agency if required. Do not cover any installed air and vapor barrier unless it has been inspected, tested and approved per requirements.
  - 8. Protect people and materials from over-spray and contact with chemicals and gases.

## 1.07 FIELD QUALITY ASSURANCE

A. Implement the ABAA Quality Assurance Program requirements. Cooperate with ABAA inspectors and independent testing and inspection agencies engaged by the Owner. Do not cover air barrier until it has been inspected, tested, and accepted.

#### 1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, expiration date, and directions for storage.
- B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air/vapor barrier manufacturer. Protect stored materials from direct sunlight.
- C. Avoid spillage. Immediately notify Owner, Architect if spillage occurs and start clean up procedures.
- D. Clean spills and leave area as it was prior to spill.
- 1.09 WASTE MANAGEMENT AND DISPOSAL
  - A. Place materials defined as hazardous or toxic waste in designated containers.
  - B. Ensure emptied containers are sealed and stored safely for disposal away from children.
- 1.10 PROJECT CONDITIONS
  - A. Environmental Conditions: Apply air/vapor barrier within range of ambient and substrate temperatures recommended by air/vapor barrier manufacturer. Do not apply air/vapor barrier to a damp or wet substrate, unless the manufacturer specifically permits that for the product.
    - 1. Do not apply air/vapor barrier in snow, rain, fog, or mist.
    - 2. Do not apply air/vapor barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the manufacturer.
    - 3. The product shall not be installed after the expiry date printed on the label of each container. The product has a shelf life of 6 months from the date of manufacture.

#### 1.11 WARRANTY

A. System Warranty: Provide the manufacturer's three year system warranty, including the primary air/vapor barrier and installed accessory sealant and membrane materials which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

## PART 2 - PRODUCTS

- 2.01 MATERIALS & MANUFACTURERS
  - A. Sprayed polyurethane foam material, when tested, shall meet the requirements of ULC S705.1-01 Standard for Thermal Insulation-Spray Applied Rigid Polyurethane Foam, Medium Density, Material- Specification.
  - B. A copy of an Evaluation Report (such as the CCMC Evaluation Report) or copies of the test reports from an accredited testing laboratory, for each physical property, indicating that the product meets the requirements of ULC S705.1-01 shall be made available upon request.
  - C. Material containers shall be labeled with the Evaluation Report number of the evaluation agency.
  - D. Design R-value as indicated in test report; minimum R6.9/inch.
  - E. Density as indicated in test report: minimum 1.7 pounds per cubic foot.
  - F. Smoke development as indicated in test report; less than 500 when tested under ULC S102.

- G. Products that meet the preceding requirements:
  - 1. Basis-of-design product: Walltite closed cell spray foam polyurethane air/vapor barrier as manufactured by BASF (215-966-1168).
- H. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of another manufacturer with approved submittal meeting the design criteria:
  - 1. Icynene: www.icynene.com
- I. Substitutions: See Section 01 6000 Product Requirements.
  - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

## 2.02 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended by air/vapor barrier manufacturer for intended use and compatible with the air/vapor barrier.
- B. Transition Membrane: Self-adhering, smooth surfaced SBS modified bitumen membrane, nominal 40 mil thickness, width as required, to detail all rough openings, changes in material substrates, and penetrations.
  - 1. Blueskin SA as manufactured by Henry Company Inc
  - 2. Butyl-based peel and stick membrane: Transition between air/vapor barrier membrane and TPO or EPDM membranes:
    - a. Blueskin SA as manufactured by Henry Company Inc.
  - 3. Primer: Water based liquid primer for concrete, masonry, gypsum sheathing, wood, metal, and painted substrates;
    - a. Aquatac as manufactured by Henry Company Inc.
  - 4. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes approved by foamed in place air/vapor barrier manufacturer.
  - 5. Sheet Membrane Transition Strip Termination Sealant:
    - a. BES 925 Sealant by Henry Company Inc.
  - 6. Sheet Membrane Sheet Membrane Air Barrier Perimeter Seal to Windows, Doors: Low modulus silicone sheet; provide manufacturer's standard system consisting of precured low-modulus silicone extrusion, in sizes to fit widths indicated, combined with a neutral-curing low modulus silicone sealant for bonding extrusions to substrates.
    - a. Pecora Sil-Span.
    - b. Dow 1-2-3 or equal.
  - 7. Provide sealants in accordance with Section 07 92 00 Joint Sealants. Comply with ASTM C920 and ASTM C920 classifications for type, grade, class, and uses.
    - a. Silicone Sealant: natural cure, low modulus, to seal sheet membrane flashing to polyethylene face of sheet rubberized-asphalt barrier and to seal between and to non-bituminous sheet systems.
      - 1) Acceptable materials:
        - (a) Dow 790
        - (b) Pecora 864
    - b. SPF (Sprayed Polyurethane Foam) Sealant: Provide one- or two-component, foamed-in-place, polyurethane foam sealant with the following characteristics:
      - 1) Density: 1.5 to 2.0 PCF.
      - 2) Flame Spread (ASTM E162): 25 or less.
      - 3) Initial R-Value (at 1 inch): Not less than 7.
      - 4) Acceptable materials:

- (a) Zerodraft Foam Sealant.
- (b) Zerodraft Insulating Air Sealant

Zerodraft (Division of Canam Building Envelope Specialists Inc.), 125 Traders Blvd. E., Unit # 4, Mississauga, ON, L4Z 2H3 Tel. 1-877-272-2626

- c. Substrate Cleaner: Non-corrosive compatible with adjacent materials.
- C. Intumescent Coating
  - 1. International Fireproof Technology Inc. DC-315: water-based, intumescent paint, conforming to the following:
    - a. Product shall pass full scale fire resistance test with spray foam insulating air barrier in accordance with NFPA 286: 24 wet mils (thermal barrier).
    - b. Finish: flat, grey color
    - c. VOC Content: 47 g/L
    - d. Volume Solids: 67%
    - e. Flash Point: none
    - f. Mechanism of cure: coalescence
    - g. Reducer/cleaner: water
- 2.03 EQUIPMENT
  - A. The equipment used to spray the polyurethane foam material shall be in accordance with ULC S705.2-02 and the equipment manufacturer's recommendations for specific type of application.
  - B. Equipment settings are to be recorded on the Daily Work Record as required by the ULC S705.2-02 Installation standard.
  - C. Each proportioner unit to supply only one spray gun.

## PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions under which air/vapor barrier systems will be applied, with Installer present, for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
  - 1. Ensure that:
    - a. surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants
    - b. concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions.
    - c. masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.
    - d. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
    - e. Notify Architect in writing of anticipated problems using air/vapor barrier over substrate.

## 3.02 SURFACE PREPARATION

- A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air/vapor barrier application.
- B. Prime ICBP metal substrates with conditioning primer when installing modified asphalt membrane transition membranes.

- C. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air/vapor barrier and at protrusions according to air/vapor barrier manufacturer's written instructions.
  - 1. Verify that surfaces and conditions are suitable to accept work as outlined in this section.
  - 2. Commencement of work outlined in this section shall be deemed as acceptance of existing work and conditions.
  - 3. Examine joints before sealing to ensure configurations, surfaces and widths are suitable for spray polyurethane foam. Report in writing all defects stating the locations of joints deemed unacceptable for the application of the spray polyurethane foam.

## 3.03 PREPARATION

- A. Protection:
  - 1. Mask and cover adjacent areas to protect from over spray.
  - 2. Ensure any required foam stop or back up material are in place to prevent over spray and achieve complete seal.
  - 3. Seal off existing ventilation equipment. Install temporary ducting and fans to ensure exhaust fumes. Provide for make-up air.
  - 4. Erect barriers, isolate area and post warning signs to advise non-protected personnel to avoid the spray area.
  - 5. Surface Preparation
    - a. Surfaces to receive foam insulation shall be clean, dry and properly fastened to ensure adhesion of the polyurethane foam to the substrate.
    - b. Ensure that all work by other trades that may penetrate through the air barrier system is in place and complete.
    - c. Ensure that surface preparation and any primers required conform to the manufacturer's instructions.
    - d. Prepare surfaces by brushing, scrubbing. Scraping, or grinding to remove loose mortar, dust, oil, grease, oxidation, mill scale and other contaminants which will affect adhesion and integrity of the spray polyurethane foam. Wipe down metal surfaces to remove release agents or other non-compatible coatings, using clean sponges or rags soaked in a solvent compatible with the spray polyurethane foam. Ensure surfaces are dry before proceeding.
    - e. Install transition membranes around and into all rough openings, to all materials penetrating the exterior wall to all applicable surfaces and ensure proper adhesion of the transition membranes to the substrate, capable of having spray polyurethane foam insulation.
    - f. Install counter-flashings:
      - 1) Metal: Mechanically fasten metal counter-flashings with screws at 8" (200 mm) o.c.
      - 2) Membrane: Cut into and uncover only 3" of siliconized release paper along one edge of the counter-flashing membrane. Adhere membrane flashing to the pre-primed substrate a minimum of 3" and roll firmly in place.
    - g. Ensure veneer anchors are in place.

## 3.04 APPLICATION

- A. Spray-application of polyurethane foam shall be installed in accordance with ULC S705.2-02 and the manufacturer's instructions.
- B. Apply only when surfaces and environmental conditions are within limits prescribed by the material manufacturer and the ULC S705.2 Installation standard.

- C. Apply in consecutive passes as recommended by manufacturer to thickness as indicated on drawings. Passes shall be not less than ½ inch and not greater than 2 inches.
- D. Do not install spray polyurethane foam within 3 inches of heat emitting devices such as light fixtures and chimneys.
- E. Finished surface of foam insulation to be free of voids and embedded foreign objects.
- F. Remove masking materials and over spray from adjacent areas immediately after foam surface has hardened. Ensure cleaning methods do not damage work performed by other sections.
- G. Trim, as required, any excess thickness that would interfere with the application of cladding/covering system by other trades.
- H. Clean and restore surfaces soiled or damaged by work of the section. Consult with section of work soiled before cleaning to ensure methods used will not damage the work.
- I. Do not permit adjacent work to be damaged by work of this section. Damage to work of this section caused by other sections shall be repaired by this section at the expense of the subcontractor causing the damage.
- J. Complete connections to other components or repair any gaps, holes or other damage using material which conforms to ULC S710.1 Polyurethane Sealant Foam - One Component -Material or ULC S711.1 Polyurethane Sealant Foam - Two Components - Material and shall be installed in accordance with ULC S710.2 Polyurethane Sealant Foam - One component -Installation or ULC S711.2 Polyurethane Sealant Foam - Two Component - Installation, whichever is appropriate.
- K. Where insulation is not protected with masonry veneer, install intumescent paint to required wet or dry mil thickness or coverage rate in accordance with manufacturer's instructions, by brush, roller, conventional or airless spray.
- 3.05 TOLERANCES
  - A. Maximum variation from indicated thickness: minus (-)  $\frac{1}{4}$  inch; plus (+)  $\frac{1}{2}$  inch.
- 3.06 PROTECTION
  - A. Cover the spray polyurethane foam with a thermal barrier when installed on the interior of the building.

## **SECTION 07 3113**

#### ASPHALT SHINGLES

#### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section includes the following:
  - 1. Asphalt shingles.
  - 2. Underlayment.
  - 3. Self-adhering sheet underlayment.
  - 4. Ridge vents
  - 5. Composite Ventilated Roof Insulation

#### 1.02 RELATED SECTIONS

- A. Division 6 Section "Rough Carpentry" for roof deck wood structural panels.
- B. Division 7 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings and counterflashings not part of this Section.
- C. Section 07 2500 Weather Barriers: Air and Vapor Barriers for roof areas.
- **1.03 DEFINITIONS** 
  - A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

#### 1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of asphalt shingle, ridge and hip cap shingles indicated.
  - 1. Include similar Samples of trim and accessories involving color selection.
- C. Samples for Verification:
  - 1. Ridge cap, drip edge and other accessories
- D. Qualification Data: For Installer.
- E. Warranties: Special warranties specified in this Section.

#### 1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain field, ridge and hip cap shingles through one source from a single asphalt shingle manufacturer.
- B. Fire-Test-Response Characteristics: Provide asphalt shingle and related roofing materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
  - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double-stack rolls.
  - 1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.

2. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

#### 1.07 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt shingle roofing to be performed according to manufacturer's written instructions and warranty requirements.
  - 1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

#### 1.08 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period. Materials failures include manufacturing defects and failure of asphalt shingles to self-seal after a reasonable time.
  - 1. Material Warranty Period: 50 years from date of Substantial Completion, prorated, with first 5 years nonprorated.
  - 2. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 110mph for 5 years from date of Substantial Completion.
  - 3. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor five years from date of Substantial Completion.
  - 4. Workmanship Warranty Period: 10 years from date of Substantial Completion.
  - 5. Special Project Warranty: Roofing Installer's warranty, signed by roofing Installer, covering Work of this Section, in which roofing Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within the following warranty period:
    - a. Warranty Period: Five years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. GAF Materials Corporation
- B. Celotex Corporation.
- C. CertainTeed Corporation.
- D. Owens Corning.

## 2.02 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Laminated-Strip Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
  - 1. Basis-of-Design Product:
    - a. GAF Materials Corporation, Elk; "Camelot", or a comparable product of one of the following:
      - 1) Celotex Corporation.
      - 2) CertainTeed Corporation.
      - 3) Owens Corning.
  - 2. Strip Size: Manufacturer's standard.
  - 3. Algae Resistance: Granules treated to resist algae discoloration.
  - 4. Color and Blends: As selected by Architect from manufacturer's full range.
- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

## 2.03 UNDERLAYMENT MATERIALS

- A. Self-Adhering Eave Protection and Underlayment Membrane:
  - 1. ASTM D 1970, minimum of 40-mil- thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied.
  - 2. Available Products, as approved by the single manufacturer:
    - a. Carlisle Coatings & Waterproofing, Div. of Carlisle Companies Inc.; Dri-Start A
    - b. Grace, W. R. & Co.; Grace Ice and Water Shield.
    - c. Henry Company; Perma-Seal PE.
    - d. Johns Manville International, Inc.; Roof Defender.
    - e. NEI Advanced Composite Technology; AC Poly Ice and StormSeal.
    - f. Owens Corning; WeatherLock M.
    - g. Polyguard Products, Inc.; Polyguard Deck Guard.
    - h. Protecto Wrap Company; Rainproof TM.
    - i. SafSeal Innovations; SafSeal 7740.
- B. Underlayment: Synthetic non-asphaltic sheet, intended by manufacturer for mechanically fastened roofing underlayment without sealed seams.
  - 1. Self Sealability: Passing nail sealability test specified in ASTM D1970.
  - 2. Low Temperature Flexibility: Passing test specified in ASTM D1970.
  - 3. Fasteners: As specified by manufacturer and building code qualification report or approval, if any.
  - 4. Products:
    - a. Deck-Armor Premium Breathable Roof Deck Protection by GAF.
    - b. Substitutions: See Division 1 Product Requirements.

#### 2.04 COMPOSITE VENTILATED ROOF INSULATION:

- A. Factory assembled, composite panel with nail base sheathing space and polyisocyanurate insulation.
  - 1. Top layer: 3/4 inch plywood sheathing.
  - 2. Ventilation Space: 2 inch wood blocking.
  - 3. Polyisocyanurate insulation board: 4-1/2"
  - 4. Total R value: 25.0 minimum.
- B. Manufacturers:
  - 1. Cornell; Product: ThermaCal 1: www.cornellcorporation.com
  - 2. Hunter Panels, LLC: Cool-Vent: www.hunterpanels.com, with two-layer staggered insulation method.
  - 3. Substitutions: See Section 016000 Product Requirements.

#### 2.05 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized steel wire shingle nails, minimum 0.120-inch- diameter, smooth shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
  - 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
  - 2. Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized steel wire with low profile capped heads or disc caps, 1-inch minimum diameter.

## 2.06 METAL FLASHING AND TRIM

- A. Sheet Metal Flashing and Trim: Comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."
  - 1. Sheet Metal: Coil-coated aluminum.
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item.
  - 1. Apron Flashings: Fabricate with lower flange a minimum of 5 inches over and 4 inches beyond each side of downslope asphalt shingles and 6 inches up the vertical surface.
  - 2. Step Flashings: Fabricate with a headlap of 2 inches and a minimum extension of 5 inches over the underlying asphalt shingle and up the vertical surface.
  - 3. Drip Edges: Fabricate in lengths not exceeding 10 feet with 2-inch roof deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge. Provide vented edge drip at vented insulation.

#### 2.07 RIDGE VENTS:

- A. Manufacturer's standard, rigid section high-density polypropylene or other UV-stabilized plastic ridge vent with nonwoven geotextile filter strips and external deflector baffles for use under ridge shingles. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Ridge Filtervent; Air Vent, Inc. (for Class A).
  - 2. Cobra Ridge Vent; GAF Building Materials Corporation.
  - 3. Roll Vent; Obdyke: Benjamin Obdyke, Inc.
  - 4. Trimline; Trimline Roof Ventilation Systems.

## **PART 3 - EXECUTION**

#### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
  - 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.
  - 3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.02 UNDERLAYMENT INSTALLATION

- A. Single-Layer Underlayment: Install single layer of underlayment on roof deck perpendicular to roof slope in parallel courses. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with underlayment nails.
  - 1. Install underlayment on roof deck not covered by self-adhering sheet underlayment.
    - a. Lap sides over self-adhering sheet underlayment not less than 3 inches in direction to shed water. Lap ends not less than 6 inches over self-adhering sheet underlayment.
- B. Self-Adhering Sheet (Ice and Water Shield) Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof deck. Comply with low-temperature installation

restrictions of underlayment manufacturer if applicable. Install at locations indicated below, unless indicated otherwise on drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.

- 1. Eaves: Extend from edges of eaves 24 inches beyond interior face of exterior wall.
- 2. Valleys: Extend from lowest to highest point 18 inches on each side.
- 3. Hips: Extend 18 inches on each side.
- 4. Sidewalls: Extend beyond sidewall 18 inches and return vertically against sidewall not less than 4 inches.
- 3.03 METAL FLASHING INSTALLATION
  - A. General: Install metal flashings and other sheet metal to comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."
    - 1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
  - B. Step Flashings: Install with a headlap of 2 inches and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.
  - C. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.
- 3.04 ASPHALT SHINGLE INSTALLATION
  - A. Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
  - B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed at least 7 inches wide with self-sealing strip face up at roof edge.
    - 1. Extend asphalt shingles 1/2 inch over fascia at eaves and rakes.
    - 2. Install starter strip along rake edge.
  - C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure, unless otherwise indicated by manufacturer.
  - D. Fasten asphalt shingle strips with a minimum of six roofing nails located according to manufacturer's written instructions.
    - 1. Where roof slope exceeds 20:12, seal asphalt shingles with asphalt roofing cement spots after fastening with additional roofing nails.
    - 2. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
    - 3. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.
  - E. Closed-Cut Valleys: Extend asphalt shingle strips from one side of valley 12 inches beyond center of valley. Use one-piece shingle strips without joints in the valley. Fasten with extra nail in upper end of shingle. Install asphalt shingle courses from other side of valley and cut back to a straight line 2 inches short of valley centerline. Trim upper concealed corners of cut-back shingle strips.
    - 1. Do not nail asphalt shingles within 6 inches of valley center.
    - 2. Set trimmed, concealed-corner asphalt shingles in a 3-inch- wide bed of asphalt roofing cement.

- 3. "California Closed-Cut Valleys" are not permitted.
- F. Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Fasten with roofing nails of sufficient length to penetrate sheathing.

#### 3.05 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 sheet metal roofing assembly including trim, copings, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.
  - 2. Install accessories integral to sheet metal roofing that are specified in Division 7 Section "Sheet Metal Flashing and Trim" to comply with that Section's requirements.

## **SECTION 07 4113**

# METAL ROOF PANELS

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Architectural roofing system of preformed steel panels.
- B. Composite Ventilated Roof Insulation
- C. Attachment system.
- D. Finishes.
- E. Accessories.

#### 1.02 RELATED REQUIREMENTS

- A. Section 06 1000 Rough Carpentry: Roof sheathing.
- B. Section 07 4213 Metal Wall Panels: Preformed wall panels.
- C. Section 07 9200 Joint Sealants: Sealing joints between metal roof panel system and adjacent construction.
- 1.03 REFERENCE STANDARDS
  - A. ASTM A792/A792M Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).
  - B. ASTM D1970/D1970M Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.

#### 1.04 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Storage and handling requirements and recommendations.
  - 2. Installation methods.
  - 3. Specimen warranty.
- B. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
  - 1. Show work to be field-fabricated or field-assembled.
- C. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.
- E. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

## 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.
- 1.07 WARRANTY
  - A. See Section 01 7800 Closeout Submittals, for additional warranty requirements.
  - B. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of twenty years from Date of Substantial Completion.
  - C. Waterproofing Warranty: Provide manufacturer's warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of five years from Date of Substantial Completion.

## PART 2 PRODUCTS

### 2.01 ARCHITECTURAL METAL ROOF PANELS

- A. Architectural Metal Roofing: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Metal Panels: Factory-formed panels with factory-applied finish.
  - 1. Steel Panels:
    - a. Aluminum-zinc alloy-coated steel conforming to ASTM A792/A792M; minimum AZ50 coating.
    - b. Steel Thickness: Minimum 24 gage (0.024 inch).
  - 2. Profile: Standing seam, with minimum 1.75 inch seam height; concealed fastener system for field seaming with special tool.
  - 3. Texture: Smooth.
  - 4. Width: Maximum panel coverage of 18 inches.
  - 5. Manufacturer: Centria: SDP 175 Structural Design Panels.
  - 6. Locations: Accent roof areas as shown.

#### 2.02 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.
- 2.03 FABRICATION
  - A. Panels: Provide factory or field fabricated panels with applied finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.
- 2.04 FINISHES
  - A. Fluoropolymer Coating System: Manufacturer's standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 0.9 mil; color and gloss to match sample.
- 2.05 COMPOSITE VENTILATED ROOF INSULATION:
  - A. Factory assembled, composite panel with nail base sheathing space and polyisocyanurate insulation.
    - 1. Top layer: 3/4 inch plywood sheathing.

- 2. Ventilation Space: 2 inch wood blocking.
- 3. Polyisocyanurate insulation board: 4-1/2"
- 4. Total R value: 25.0 minimum.
- B. Manufacturers:
  - 1. Cornell; Product: ThermaCal 1: www.cornellcorporation.com
  - 2. Hunter Panels, LLC: Cool-Vent: www.hunterpanels.com, with two-layer staggered insulation method.
  - 3. Substitutions: See Section 016000 Product Requirements.

## 2.06 ACCESSORIES

- A. Miscellaneous Sheet Metal Items: Provide flashings, trim, moldings, closure strips, and caps of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
- B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.
- C. Sealants:
  - 1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
  - 2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
- D. Self-Adhering Eave Protection Membrane:
  - 1. ASTM D 1970, minimum of 40-mil- thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied.
  - 2. Manufacturer and Products:
    - a. Carlisle Coatings & Waterproofing, Div. of Carlisle Companies Inc.; Dri-Start A
    - b. Grace, W. R. & Co.; Grace Ice and Water Shield.
    - c. Henry Company; Perma-Seal PE.
    - d. Owens Corning; WeatherLock M.
    - e. Substitutions: See Section 01 6000 Product Requirements.
- E. Underlayment: Synthetic non-asphaltic sheet, intended by manufacturer for mechanically fastened roofing underlayment without sealed seams.
  - 1. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
  - 2. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
  - 3. Fasteners: As specified by manufacturer and building code qualification report or approval.

# PART 3 EXECUTION

## 3.01 EXAMINATION

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

## 3.02 PREPARATION

A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.

- B. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.
- C. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

## 3.03 UNDERLAYMENT INSTALLATION

- A. Underlayment: Install single layer of underlayment on roof deck perpendicular to roof slope in parallel courses. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with underlayment nails.
  - 1. Install underlayment on roof deck not covered by self-adhering sheet underlayment.
    - a. Lap sides over self-adhering sheet underlayment not less than 3 inches in direction to shed water. Lap ends not less than 6 inches over self-adhering sheet underlayment.
- B. Self-Adhering Sheet (Ice and Water Shield) Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below, unless indicated otherwise on drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.
  - 1. Eaves: Extend from edges of eaves 24 inches beyond interior face of exterior wall.
  - 2. Valleys: Extend from lowest to highest point 18 inches on each side.

## 3.04 INSTALLATION

- A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
  - 1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
  - 2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.
- B. Accessories: Install all components required for a complete roofing assembly, including flashings, trim, moldings, closure strips, caps, rib closures, ridge closures, and similar roof accessory items.
- C. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.
  - 1. Form weathertight standing seams incorporating concealed clips, using an automatic mechanical seaming device approved by the panel manufacturer.
  - 2. Incorporate concealed clips at panel joints, and snap panels together to provide weathertight joints.
  - 3. Install sealant or sealant tape, as recommended by panel manufacturer, at end laps and side joints.

## 3.05 CLEANING

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

#### 3.06 PROTECTION

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

# SECTION 07 4213 METAL WALL PANELS

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Concealed and exposed fastener metal wall panels as part of the assembly described below.
  - 1. Metal Wall Panels over Masonry Wall System: Single-skin exposed fastener metal wall panels applied as exterior cladding over a masonry wall and spray-applied insulation. Metal wall panel installation specified in this Section includes secondary metal subgirt framing for panel attachment.
  - 2. Single-skin concealed fastener metal wall panels applied as exterior cladding over a framed wall and spray-applied insulation.

#### 1.02 RELATED REQUIREMENTS

- A. Division 04 Section "Unit Masonry"
- B. Division 07 Section "Air Barriers": applied air, moisture, and water vapor control membrane.
- C. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal copings, flashings, reglets and roof drainage items.
- D. Division 07 Section "Joint Sealants" for field-applied joint sealants.

### 1.03 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA):
  - 1. AAMA 621 Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
- B. ASTM International (ASTM):
  - 1. ASTM A 653/A 653M Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 2. ASTM C 754 Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products.
  - 3. ASTM C 920 Specification for Elastomeric Joint Sealants.
  - 4. ASTM C 1007 Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
  - 5. ASTM E 72 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
- C. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
  - 1. Architectural Sheet Metal Manual.

#### 1.04 PERFORMANCE REQUIREMENTS

- A. General: Provide metal wall panel assemblies meeting performance requirements as determined by application of specified tests by a qualified testing agency on manufacturer's standard assemblies.
- B. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, per ASTM E 72:
  - 1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
- 2. Limits of Deflection: Metal wall panel assembly shall withstand scheduled wind pressure with the following allowable deflection:
  - a. Maximum allowable deflection limited to L/180 deflection of panel perimeter normal to plane of wall with no evidence of failure.
- 3. Secondary Metal Framing: Design secondary metal framing for metal wall panel assembly according to AISI's "Standard for Cold-Formed Steel Framing General Provisions."
- 4. Side Joint Disengagement: Panels must be designed and tested under Negative load per ASTM E 72.
- C. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.

# 1.05 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal wall panel and panel accessories from a single manufacturer.
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum 10 years experience in manufacture of similar products in successful use in similar applications.
  - 1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
    - a. Product data, including certified independent test data indicating compliance with requirements.
    - b. Sample submittal from similar project.
    - c. Project references: Minimum of 5 installations not less than 5 years old, with Owner and Architect contact information.
    - d. Sample warranty.
  - 2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
  - 3. Approved manufacturers must meet separate requirements of Submittals Article.
- C. Installer Qualifications: Experienced Installer with minimum of 5 years experience with successfully completed projects of a similar nature and scope.

# 1.06 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct preinstallation meeting at site attended by Construction Manager, Owner, Architect, manufacturer's representative, and other trade contractors.
  - 1. Coordinate building framing in relation to metal wall panel assembly.
  - 2. Coordinate installation of building air and water barrier behind metal wall panel assembly.
  - 3. Coordinate window, door and louver, and other openings and penetrations of metal wall panel assembly.

# 1.07 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets, for specified products.
  - 1. Include data indicating compliance with performance requirements, including load span tables tested for side joint disengagement under negative loads per ASTM E 72.
- B. Shop Drawings: Provide shop drawings prepared by manufacturer or manufacturer's authorized Installer. Include full elevations showing openings and penetrations. Include details of each condition of installation and attachment. Provide details at a minimum scale 1-1/2-inch per foot of all required trim and extrusions needed for a complete installation.

- 1. Indicate points of supporting structure that must coordinate with metal wall panel assembly installation.
- C. Samples for Initial Selection: For each product specified, provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification: Provide 12-inch (300 mm) section of panel(s) showing finishes. Provide 12-inch (300 mm) long pieces of trim pieces and other exposed components.

#### 1.08 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Indicating compliance of products with requirements, from a qualified independent testing agency.
- B. Qualification Information: For Installer firm.
- C. Manufacturer's warranty: Submit sample warranty.

# 1.09 CLOSEOUT SUBMITTALS

A. Maintenance data.

# 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protect metal wall panel products during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage.
  - 1. Deliver, unload, store, and erect metal wall panel products and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.

#### 1.11 WARRANTY

- A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials and workmanship within two years from date of Substantial Completion.
- B. Special Panel Finish Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal wall panels that evidence deterioration of finish within the following periods from the date of substantial completion:
  - 1. Warranty Period: 20 years.

# PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Basis of Design:
  - CENTRIA Architectural Systems; Moon Township, PA 15108-2944. Tel: (800)759-7474. Tel: (412)299-8000. Fax: (412)299-8317. Email: info@CENTRIA.com. Web: www.CENTRIA.com.
    - a. Type 1: NOT USED.
    - b. Type 2: NOT USED.
    - c. Type 3: Intercept Series
      - 1) Location: Fieldhouse
- B. Other Manufacturers: Products meeting the performance and appearance must be submitted for approval during the bidding period. The following may be considered pending color and sample pre-approval, including accessories.
  - 1. ATAS International, Inc.: 6612 Snowdrift Road, Allentown, PA 18106. www.atas.com.
  - 2. MBCI.

# 2.02 METAL WALL PANEL MATERIALS

- A. Metallic-Coated Steel Face Sheet: Coil-coated, ASTM A 755/A 755M.
  - 1. Aluminum-zinc alloy-coated Steel Sheet: ASTM A 792/A 792 M, Class AZ50 Grade 50 (Class AZM150, Grade 275), structural steel quality.
  - 2. Face Sheet: Minimum 0.030 inch/22 gage (0.76 mm) nominal uncoated thickness.
  - 3. Surface: Smooth.

# 2.03 CONCEALED FASTENER METAL WALL PANELS

- A. Metal Wall Panels, General: Factory-formed, concealed fastener panels with interconnecting side joints, fastened to supports with concealed fasteners, with factory-applied sealant in side laps when required to meet performance requirements.
- B. Horizontal Joints: Horizontal Joints with drip edge and sloped drain shelf to provide positive water shed away from Panel Joinery.
- C. Type 3: Closed-joint back-ventilated Rainscreen Panel with <sup>3</sup>/<sub>4</sub>"(19mm) wide reveals betweeen panels with independent panel attachment.
  - 1. Basis of Design Product: CENTRIA, Intercept Entyre Panel System
  - 2. Installation Sequence:
    - a. Bottom up
  - 3. Installation Patterns:
    - a. Vertical and/or horizontal orientation
    - b. Variable running bond-vertically and horizontally
  - 4. Panel Reveal Width:
    - a. 3/4" [19mm] Standard
  - 5. Panel Depth:
    - a. 1 3/8" [35 mm] Standard

# 2.04 METAL WALL PANEL ACCESSORIES

- A. Metal Wall Panel Accessories, General: Provide complete metal wall panel assembly incorporating trim, copings, fasciae, parapet caps, soffits, sills, inside and outside corners, and miscellaneous flashings. Provide manufacturer's factory-formed shims, flashings, gaskets, lap strips, closure strips, and caps for a complete installation. Fabricate accessories in accordance with SMACNA Manual.
- B. Mitered Corners: Structurally-bonded horizontal interior and exterior trimless corners matching metal wall panel material, profile, and factory-applied finish, fabricated and finished by metal wall panel manufacturer.
  - 1. Welded, riveted, fastened, or field- fabricated corners do not meet the requirements of this specification.
  - 2. Basis of Design: CENTRIA, MicroSeam Corners.
- C. Formed Flashing and Trim: Match material, thickness, and color of metal wall panels.
- D. Sealants: Type recommended by metal wall panel manufacturer for application, meeting requirements of Division 07 Section "Joint Sealants."
- E. Flashing Tape: 4-inch wide self-adhering butyl flashing tape.
- F. Fasteners: Self-tapping screws and other acceptable fasteners recommended by panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal wall panels by means factory-applied coating.

# 2.05 SECONDARY METAL SUBGIRT FRAMING

- A. Miscellaneous Framing Components, General: Cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z180).
  - 1. Hat Channels: 0.053 inch/16 ga. (1.34 mm) minimum.
  - 2. Sill Channels: 0.053 inch/16 ga. (1.34 mm) minimum.

# 2.06 METAL WALL PANEL FINISHES

- A. Exposed Coil-Coated Finish System:
  - 1. Fluoropolymer Two-Coat System: 0.2-mil primer with 0.8-mil 70 percent PVDF fluoropolymer color coat, AAMA 621.
    - a. Basis of Design: CENTRIA Fluorofinish.
- B. Color:
  - 1. Exterior Surface: As selected by Architect from manufacturer's standard colors.
  - 2. Interior Surface: Manufacturer's standard primer color.

# PART 3 - EXECUTION

- 3.01 EXAMINATION
  - A. Examine metal wall panel substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal wall panels.
  - B. Wall Substrate: Confirm that wall substrate is within tolerances acceptable to metal wall panel system manufacturer.
    - 1. Maximum substrate and framing deviations from flat plane acceptable:
      - a. 1/4-inch in 20 feet vertically or horizontally.
      - b. 1/2-inch across building elevation.
      - c. 1/8-inch in 5 feet.
  - C. Openings: Verify that window, door, louver and other penetrations match layout on shop drawings.
  - D. Air/Moisture Barriers: Confirm that work has been completed, inspected, and tested as required.
  - E. Correct out-of-tolerance work and other deficient conditions prior to proceeding with metal wall panel system installation.
- 3.02 SECONDARY FRAMING INSTALLATION
  - A. Secondary Metal Subgirt Framing: Install secondary metal framing components to tolerances indicated, as shown on approved shop drawings. Install secondary metal framing and other metal panel supports per ASTM C 1007 and metal wall panel manufacturer's recommendations.

# 3.03 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in accordance with approved shop drawings and manufacturer's recommendations. Install metal wall panels in orientation, sizes, and locations indicated. Anchor metal wall panels and other components securely in place. Provide for thermal and structural movement
- B. Attach panels to metal framing using recommended clips, screws, fasteners, sealants, and adhesives indicated on approved shop drawings.
  - 1. Fasteners for Steel Wall Panels: Stainless-steel for exterior locations and locations exposed to moisture; carbon steel for interior use only.

- 2. Fasten metal wall panels to supports with fasteners and spacing recommended by manufacturer.
- 3. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- 4. Dissimilar Materials: Where elements of metal wall panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.
- C. Joint Sealers: Install joint sealants where indicated on approved shop drawings.
- 3.04 ACCESSORY INSTALLATION
  - A. General: Install metal wall panel accessories with positive anchorage to building and provide for thermal expansion. Coordinate installation with flashings and other components.
    - 1. Install related flashings and sheet metal trim per requirements of Division 07 Section "Sheet Metal Flashing and Trim."
    - 2. Install components required for a complete metal wall panel assembly, including trim, copings, corners, lap strips, flashings, sealants, fillers, closure strips, and similar items.
    - 3. Comply with performance requirements and manufacturer's written installation instructions.
    - 4. Provide concealed fasteners except where noted on approved shop drawings.
    - 5. Set units true to line and level as indicated.

# 3.05 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a service representative authorized by metal wall panel manufacturer to inspect completed installation. Submit written report.
- B. Correct deficiencies noted in manufacturer's report.
- 3.06 CLEANING AND PROTECTION
  - A. Remove temporary protective films. Clean finished surfaces as recommended by metal wall panel manufacturer. Clear weep holes and drainage channels of obstructions, dirt, and sealant. Maintain in a clean condition during construction.
  - B. Replace damaged panels and accessories that cannot be repaired by finish touch-up or minor repair.

# **END OF SECTION**

# **SECTION 07 6200**

# SHEET METAL FLASHING AND TRIM

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings and counterflashings.
- B. Sealants for joints within sheet metal fabrications.

#### 1.02 RELATED REQUIREMENTS

- A. Section 04 2000 Unit Masonry: Installation of flashing materials embedded in masonry.
- B. Section 06 1000 Rough Carpentry: Wood nailers for sheet metal work.
- C. Section 07 2500 Weather Barriers: Installation of weather barriers and interface with flashing materials.
- D. Section 07 3113 Asphalt Shingles: Non-metallic flashings associated with shingle roofing.
- E. Section 07 9200 Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

# 1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. ASTM B32 Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- D. ASTM D2178/D2178M Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a.
- E. SMACNA (ASMM) Architectural Sheet Metal Manual; 2012.
- 1.04 ADMINISTRATIVE REQUIREMENTS
  - A. Preinstallation Meeting: Convene one week before starting work of this section.
- 1.05 SUBMITTALS
  - A. See Section 01 3000 Administrative Requirements, for submittal procedures.
  - B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
  - C. Samples: Submit two samples 6 by 6 inch in size illustrating metal finish color.

#### 1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Maintain one copy of each document on site.
- C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.
- 1.07 DELIVERY, STORAGE, AND HANDLING
  - A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
  - B. Prevent contact with materials that could cause discoloration or staining.

# PART 2 PRODUCTS

# 2.01 SHEET MATERIALS

A. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gage, (0.0156 inch) thick; smooth No. 4 - Brushed finish.

# 2.02 FLASHING TYPES

- A. Flashing Type 1: 2-piece interlocking type:
  - 1. Material: Stainless steel.
  - 2. Configurations shall be as shown on drawings.
  - 3. Where cap flashings or counter flashings occur, they shall be of two-piece construction with a receiver having a special vertical locking slot that requires no malleting or bending to hold the insert member in place.
  - 4. Keyed or corrugated flashings are unacceptable.
  - 5. Fasteners, solder for sealing and attachment, etc., shall be as recommended by the manufacturer.
  - 6. Where flashings do not turn up behind walls, terminate with a 1/4" hook dam.
  - 7. Thru-wall flashings at parapets shall be hemmed flush with the exposed face of face brick.
  - 8. Fasteners, mastic for sealing and attachment, etc., shall be as recommended by the manufacturer.
- B. Flashing Type 2: Masonry thru-wall type:
  - 1. Stainless steel core flexible flashing with drainage fabric:
    - a. Product standard of quality: York Manufacturing, Inc.; York Flash-Vent SS,
    - b. Accepted products:
      - 1) York Manufacturing, Inc.; York Flash-Vent SS, (www.yorkmfg.com)
      - 2) STS Coatings, Inc.; Wall Guardian TWF Stainless Steel (www.stscoatings.com)
      - 3) Building Materials West Company, Inc.; Evacu-Flash SS (www.evacu-flash.com)
  - 2. Configurations shall be as shown on drawings.
  - 3. Installation: Refer to Section 04 2000 Unit Masonry.
- C. Flashing Type 3: NOT USED.
- D. Flashing Type 4: Formed metal flashing (other than Type 1):
  - 1. Material: Matching sheet metal roofing and wall panels.
  - 2. Configurations shall be as shown on drawings.
- 2.03 ACCESSORIES
  - A. Fasteners: Stainless steel, with soft neoprene washers.
  - B. Outside corner and inside corner material; manufacturer's standard available units using:
    - 1. Stainless steel: 26 gauge stainless steel.
  - C. End dam: Product may be folded in line with the flashing material or utilize preformed end dams by manufacturer using:
    - 1. Stainless steel: 26 gauge stainless steel
  - D. Protective Backing Paint: Asphaltic mastic, ASTM D4479 Type I.
  - E. Sealant to be Concealed in Completed Work: Type 3 as specified in Section 07 9200.
  - F. Sealant to be Exposed in Completed Work: Type 1 as specified in Section 07 9200.
  - G. Reglets: Surface mounted type, galvanized steel; face and ends covered with plastic tape.

H. Termination Bars: 1 inch wide x 1/8 inch thick; high strength extruded polypropylene.

# 2.04 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 3/4 inch and hemmed to form drip.
- G. Fabricate flashings to allow toe to extend 2 inches over roofing membrane. Return and brake edges.

# PART 3 EXECUTION

# 3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

# 3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

# 3.03 INSTALLATION

- A. Conform to drawing details and to the following:
  - 1. SMACNA Architectural Sheet Metal Manual,
- B. Insert flashings into reglets to form tight fit; secure in place with plastic wedges; seal flashings into reglets with sealant.
- C. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- D. Apply plastic cement compound between metal flashings and felt flashings.
- E. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- F. Fasten cavity wall flashings to stud back-up with a non-corrosive termination bar and seal the top edge of the flashing with sealant.
- G. Seal metal joints watertight.

# 3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 Quality Requirements, for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

# **END OF SECTION**

# **SECTION 07 7123**

# MANUFACTURED GUTTERS AND DOWNSPOUTS

#### PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Pre-finished aluminum gutters and downspouts.
- 1.02 RELATED REQUIREMENTS
  - A. Section 07 3113 Asphalt Shingles: Sloped roofing system.
  - B. Section 05 5000 Metal Fabrications: Downspout boots.
- 1.03 REFERENCE STANDARDS
  - A. AAMA 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
  - B. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
  - C. ASTM B209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
  - D. SMACNA (ASMM) Architectural Sheet Metal Manual; 2012.

#### 1.04 ADMINISTRATIVE REQUIREMENTS

- A. Conform to SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.
- B. Conform to applicable code for size and method of rain water discharge.
- 1.05 SUBMITTALS
  - A. Product Data: Provide data on prefabricated components.
  - B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.
  - C. Samples: Submit two samples, 12 inch long illustrating component design, finish, color, and configuration.
- 1.06 DELIVERY, STORAGE, AND HANDLING
  - A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
  - B. Prevent contact with materials that could cause discoloration, staining, or damage.

# PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Gutters and Downspouts:
  - 1. SAF Perimeter Systems, a division of Southern Aluminum Finishing Company, Inc; Colonial Profile 6 Concealed Drain Gutter: www.saf.com/persys.
  - 2. Substitutions: See Section 01 6000 Product Requirements.

#### 2.02 MATERIALS

- A. Pre-Finished Aluminum Sheet: ASTM B209 (ASTM B209M); 0.050 inch thick.
  - 1. Finish: Plain, shop pre-coated with PVDF (polyvinylidene fluoride) coating.
  - 2. Color: As indicated.

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# 2.03 COMPONENTS

- A. Gutters: Profile as indicated.
- B. Downspouts: CDA Rectangular profile.
- C. Anchors and Supports: Profiled to suit gutters and downspouts.
  - 1. Gutter Supports: Brackets.
  - 2. Downspout Supports: Brackets.
- D. Fasteners: Stainless steel, with soft neoprene washers.

# 2.04 FABRICATION

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

# 2.05 FINISHES

A. Fluoropolymer Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.

# PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify existing conditions before starting work.
  - B. Verify that surfaces are ready to receive work.
- 3.02 PREPARATION
  - A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

#### 3.03 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Slope gutters 1/16 inch per foot.
- D. Connect downspouts to downspout boots at 24 inches above grade. Seal connection watertight.

# END OF SECTION

# SECTION 07 8400 FIRESTOPPING

#### PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Firestopping systems.
  - B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.
- 1.02 RELATED REQUIREMENTS
  - A. Section 09 2116 Gypsum Board Assemblies: Gypsum wallboard fireproofing.
- 1.03 REFERENCE STANDARDS
  - A. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.
  - B. ASTM E814 Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.
  - C. ASTM E1966 Standard Test Method for Fire Resistive Joint Systems; 2007 (Reapproved 2011).
  - D. ASTM E2174 Standard Practice for On-Site Inspection of Installed Firestops; 2014b.
  - E. ASTM E2393 Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2010a (Reapproved 2015).
  - F. ASTM E2307 Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2015b.
  - G. ASTM E2837 Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013.
  - H. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
  - I. ITS (DIR) Directory of Listed Products; current edition.
  - J. FM (AG) FM Approval Guide; current edition.
  - K. UL 1479 Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
  - L. UL 2079 Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.
  - M. UL (DIR) Online Certifications Directory; current listings at database.ul.com.
  - N. UL (FRD) Fire Resistance Directory; current edition.
- 1.04 SUBMITTALS
  - A. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
  - B. Product Data: Provide data on product characteristics, performance ratings, and limitations.
  - C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
  - D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

#### 1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
  - 1. Listing in UL (FRD) or FM (AG) will be considered as constituting an acceptable test report.
  - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and: 1. Trained by manufacturer.
  - 2. Verification of minimum three years documented experience installing work of this type.

# 1.06 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

# PART 2 PRODUCTS

- 2.01 MANUFACTURERS
  - A. Firestopping Manufacturers:
    - 1. 3M Fire Protection Products: www.3m.com/firestop.
    - 2. Hilti, Inc: www.us.hilti.com/#sle.
    - 3. Nelson FireStop Products: www.nelsonfirestop.com.
    - 4. Specified Technologies Inc: www.stifirestop.com/#sle.
    - 5. Substitutions: See Section 01 6000 Product Requirements.

#### 2.02 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Mold and Mildew Resistance: Provide firestoppping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.
- C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.
- D. Fire Ratings: Refer to drawings for required systems and ratings.

# 2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. General:
  - 1. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
  - 2. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- B. Perimeter Fire Containment Firestopping: Use any system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.

- 1. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.
- C. Head-of-Wall Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use any system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.
  - 1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.
- D. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use any system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
  - 1. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.
- E. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
  - 1. Temperature Rise: Where penetration is not contained in a wall cavity, provide systems that have been tested to show T Rating equal to F Rating, where required by code.
  - 2. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

# 2.04 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
  - 1. Fire Ratings: Use any system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

# PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify openings are ready to receive the work of this section.
- 3.02 PREPARATION
  - A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
  - B. Remove incompatible materials that could adversely affect bond.
  - C. Install backing materials to arrest liquid material leakage.
- 3.03 COORDINATION
  - A. Coordinate construction of openings, penetrations and construction joints to ensure that the fire stop systems are installed according to specified requirements.
  - B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration fire stop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
  - C. Coordinate fire stopping with other trades so that obstructions are not placed in the way prior to the installation of the fire stop systems.

D. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

#### 3.04 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Install labeling required by code.

# 3.05 FIELD QUALITY CONTROL

- A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174, and ASTM E2393.
- B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

#### 3.06 CLEANING

A. Clean adjacent surfaces of firestopping materials.

# 3.07 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

# END OF SECTION

# SECTION 07 9200 JOINT SEALANTS

# PART 1 GENERAL

#### 1.01 SECTION INCLUDES

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

#### 1.02 RELATED REQUIREMENTS

- A. Section 07 1300 Sheet Waterproofing: Sealing cracks and joints in waterproofing substrate surfaces using materials specified in this section.
- B. Section 07 2500 Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
- C. Section 07 8400 Firestopping: Firestopping sealants.
- D. Section 08 7100 Door Hardware: Setting exterior door thresholds in sealant.
- E. Section 08 8000 Glazing: Glazing sealants and accessories.
- F. Section 09 2116 Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.
- G. Section 09 2216 Non-Structural Metal Framing: Sealing between framing and adjacent construction in acoustical and sound-rated walls and ceilings.
- H. Section 09 3000 Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

# 1.03 REFERENCE STANDARDS

- A. ASTM C661 Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2006 (Reapproved 2011).
- B. ASTM C834 Standard Specification for Latex Sealants; 2014.
- C. ASTM C919 Standard Practice for Use of Sealants in Acoustical Applications; 2012.
- D. ASTM C920 Standard Specification for Elastomeric Joint Sealants; 2014a.
- E. ASTM C1193 Standard Guide for Use of Joint Sealants; 2016.
- F. ASTM C1248 Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
- G. ASTM C1311 Standard Specification for Solvent Release Sealants; 2014.
- H. ASTM C1330 Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002 (Reapproved 2013).
- I. ASTM C1521 Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.

#### 1.04 SUBMITTALS

- A. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
  - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
  - 2. List of backing materials approved for use with the specific product.

- 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
- 4. Substrates the product should not be used on.
- B. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.
- E. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
- F. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
- G. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.
- H. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

# 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- D. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
  - 1. Identification of testing agency.
  - 2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
    - a. Test date.
    - b. Copy of test method documents.
    - c. Age of sealant upon date of testing.
    - d. Test results, modeled after the sample form in the test method document.
    - e. Indicate use of photographic record of test.
- E. Field Quality Control Plan:
  - 1. Visual inspection of entire length of sealant joints.
  - 2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
  - 3. Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.

- a. For each different sealant and substrate combination, allow for one test every 100 feet in the first 1000 linear feet, and one test per 1000 linear feet thereafter, or once per floor on each elevation.
- b. If any failures occur in the first 1000 linear feet, continue testing at frequency of one test per 500 linear feet at no extra cost to Owner.
- 4. Field testing agency's qualifications.
- 5. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
- F. Field Adhesion Test Procedures:
  - 1. Allow sealants to fully cure as recommended by manufacturer before testing.
  - 2. Have a copy of the test method document available during tests.
  - 3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
  - 4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
  - 5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
  - 6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
- G. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
- H. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
  - 1. Sample: At least 18 inch long.
  - 2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
  - 3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.
- 1.06 WARRANTY
  - A. Correct defective work within a five year period after Date of Substantial Completion.
  - B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

# PART 2 PRODUCTS

- 2.01 JOINT SEALANT APPLICATIONS
  - A. Scope:
    - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      - a. Wall expansion and control joints.
      - b. Joints between door, window, and other frames and adjacent construction.
      - c. Joints between different exposed materials.

- d. Openings below ledge angles in masonry.
- e. Other joints indicated below.
- 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
  - a. Joints between door, window, and other frames and adjacent construction.
  - b. Joints between plumbing fixtures and adjacent construction.
- 3. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
- 4. Do not seal the following types of joints.
  - a. Intentional weepholes in masonry.
  - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
  - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
  - d. Joints where installation of sealant is specified in another section.
  - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, Type 1, unless otherwise indicated.
- C. Interior Joints: Use non-sag acrylic latex sealant, Type 2, unless otherwise indicated.
  - 1. Interior Expansion and Control Joints: Polyurethane sealant; Type 1A.
  - 2. Fire-rated Construction: ASTM C 834, UL Listed.
  - 3. In Sound-Rated Assemblies: Acoustical sealant; Type 5.
  - 4. Interior Wet Areas: Type 6 Mildew-Resistant Silicone Sealant: not expected to withstand continuous water immersion or traffic. Bathrooms, restrooms, kitchens, food service areas, and food processing areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

#### 2.02 JOINT SEALANTS - GENERAL

- A. Sealant Types Summary:
  - 1. Type 1: Non-Staining Silicone.
  - 2. Type 1A: Polyurethane.
  - 3. Type 2: Acrylic Emulsion Latex
  - 4. Type 3: Non-Curing Butyl Sealant
  - 5. Type 4: Fire resistant foam sealant: Refer to Section 07 8400 Firestopping.
  - 6. Type 5: Acoustical Sealant
  - 7. Type 6: Mildew-Resistant Silicone Sealant

#### 2.03 NONSAG JOINT SEALANTS

- A. Type 1 Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus 50 percent, minimum.
  - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
  - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
  - 4. Color: To be selected by Architect from manufacturer's standard range.
  - 5. Cure Type: Single-component, neutral moisture curing.
  - 6. Service Temperature Range: Minus 65 to 180 degrees F.
  - 7. Manufacturers:

- a. Dow Corning Corporation; 795 Silicone Building Sealant: www.dowcorning.com/construction/sle.
- b. Sika Corporation; Sikasil WS-295: www.usa-sika.com.
- c. Pecora Corporation; 890NST: www.pecora.com.
- d. Substitutions: See Section 01 6000 Product Requirements.
- B. Type 1A Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus 25 percent, minimum.
  - 2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
  - 3. Color: To be selected by Architect from manufacturer's standard range.
  - 4. Service Temperature Range: Minus 40 to 180 degrees F.
  - 5. Manufacturers:
    - a. Pecora Corporation; DynaTrol 1-XL: www.pecora.com.
    - b. Sika Corporation; Sikaflex-15 LM: www.usa-sika.com.
    - c. Tremco Commercial Sealants & Waterproofing; Dymonic 100: www.tremcosealants.com/#sle.
    - d. Substitutions: See Section 01 6000 Product Requirements.
- C. Type 2 Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
- D. Type 3 Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, non-sag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.
- E. Type 4: Fire resistant foam sealant: Refer to Section 07 8400 Firestopping.
- F. Type 5 Acoustical Sealant for Concealed Locations: ASTM C 834, UL Listed.
  - 1. Composition: Acrylic latex emulsion sealant.
  - 2. Applications: Use for concealed locations only:
    - a. Acoustical application: Sealant bead between top stud runner and structure and between bottom stud track and floor.
  - 3. Products:
    - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant: www.pecora.com.
    - b. Hilti, Inc.; CP 506 Smoke and Acoustical Sealant: www.us.hilti.com.
    - c. USG Company; Sheetrock Brand Acoustical Sealant; www.usg.com.
- G. Type 6 Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
  - 1. Color: White.
  - 2. Manufacturers:
    - a. Pecora Corporation: www.pecora.com.
    - b. Sika Corporation; Sikasil GP: www.usa-sika.com.
- 2.04 ACCESSORIES
  - A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
    - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B Bi-Cellular Polyethylene.
    - 2. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

- 3. Manufacturers:
  - a. Nomaco, Inc; SOF Rod: www.nomaco.com.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

# PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that joints are ready to receive work.
  - B. Verify that backing materials are compatible with sealants.
  - C. Verify that backer rods are of the correct size.
  - D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
    - 1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
    - 2. Notify Architect of date and time that tests will be performed, at least 7 days in advance.
    - 3. Record each test on Preinstallation Adhesion Test Log as indicated.
    - 4. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Architect.
    - 5. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

# 3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

# 3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
  - 1. Width/depth ratio of 2:1.
  - 2. Neck dimension no greater than 1/3 of the joint width.
  - 3. Surface bond area on each side not less than 75 percent of joint width.
- E. Install bond breaker backing tape where backer rod cannot be used.

- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

# 3.04 FIELD QUALITY CONTROL

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.
- C. Destructive Adhesion Testing: If there are any failures in first 1000 linear feet, notify Architect immediately.
- D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.
- E. Repair destructive test location damage immediately after evaluation and recording of results.

# 3.05 POST-OCCUPANCY

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

# **END OF SECTION**

# SECTION 08 0671 HARDWARE SETS

#### **PART 1 - DOOR HARDWARE SETS**

#### 1.01 GENERAL

- A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
- B. The supplier is responsible for handing and sizing all products as listed in the door hardware sets. Quantities listed are for each pair of doors, or for each single door.
- C. Products listed in the Door Hardware Sets must meet the requirements described in the specification sections noted.
  - 1. Section 08 7100 Door Hardware.
  - 2. Section 28 7400 Access Control Hardware.
- D. Manufacturer's Abbreviations:
  - 1. MK McKinney
  - 2. PE Pemko
  - 3. RI RITE Door
  - 4. RO Rockwood
  - 5. RU Corbin Russwin
  - 6. AD Adams Rite
  - 7. RF Rixson
  - 8. NO Norton
  - 9. SU Securitron
  - 10. AK Alarm Controls

#### Set: 1.0

Doors: B100H, B135B, C102CA, C103E, C104, C104B, C104C, C115, C115A, C117, C117A, C117B, D100BA, D105FA, D105FB, D105FC, D105FD, D111B, E115A, E124A, FH01A, FH01B, FH01C, FH02C, FH02D, FH02E, MB100B, MB100C, MB100D, PB100AC, PB100AD

#### All Hardware

#### BY DOOR SUPPLIER

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#### Set: 2.0

Doors: A100K, A199AA, A199AB, A199AC, A199AD, A199BA, A199CA, A299AB, A299AC, A299B, A299C, B100C, B100E, B100F, B199FA, B199FB, B199FC, B199FD, B199FE, B199GA, B199HA, B199JA, B199KA, B200EA, B200EB, B200FA, B200K, B299F, B299FA, B299FB, B299FC, B299G, B299J, C100EA, C100EB, C100LB, D100C, E199LA, E299LA

2	Continuous Hinge	D329 83-1/8"	630	RI
2	Recessed Exit	D3676	US32D	RI
1	Trim	D3080-02 Cyl	US32D	RI
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU

Fairview Campus – New Middle and High School

2	Surface Closer	D-DCT-351PKT90	EN	RI
2	Kick Plate	D-KP 10" high SA	US32D	RI
2	Electromagnetic Holder	D-MDH-310 900-XXX	689	RI
1	Seal Kit	D-SS44-STK-DBZ	Dark Bronze	RI
1	Seal Kit	D-SS-STK-DBZ	Dark Bronze	RI

# Set: 3.0

# Doors: C102C, C103

1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Door Stop	403 (or) 441CU	US26D	RO

Notes: Balance of hardware by STC door supplier.

# Set: 4.0

# Doors: C110, C111, C138, C139

1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Door Stop	403 (or) 441CU	US26D	RO

Notes: Balance of hardware by STC door supplier.

#### Set: 5.0

Doors: C103A, C103B

1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	R7500 (or) PR7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO

Notes: Balance of hardware by STC door supplier.

#### Set: 6.0

# Doors: C107, C108, C126, C130E

1	Removable Mullion	907BKM - DOOR HEIGHT	RU
I	Removable Mullion	90/BKM - DOOR HEIGHT	RU

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2	Exit Device (rim, classroom)	ED5200 L955	630	RU
2	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
2	Interchangeable Core	8027	630	RU
2	Surface Closer	J7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
2	Door Stop	403 (or) 441CU	US26D	RO

Notes: Balance of hardware by STC door supplier.

# Set: 7.0

1	Exit Device (rim, classroom)	ED5200 L955	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	J7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO

Notes: **\*\*\***SET NOT USED**\*\*\*** Balance of hardware by STC door supplier.

# Set: 8.0

Doors: A100DB, C100AB, C100AC, C100CA, C100CB, E100AB, E100AC, E100AD, E100JB, E100JC, E100JD, E100JE, E100JF, E100JG, E101CC, E101DD, E101EE, E101FF, E101GG

2	Continuous Hinge	CFM_SLF-HD1 PT - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
2	Exit Device (rim, exit only)	ED5200 EO M92	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Surf Overhead Stop	8-336	630	RF
2	Surface Closer	J7500	689	NO
1	Threshold	272A MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	5110BL		PE
2	Sweep	3452CNB		PE
2	Frame Harness	QC-C1500P		MK
2	Door Harness	QC-C LENGTH TO SUIT		MK
2	Electric Power Transfer	EL-CEPT		SU
2	Door Position Switch	DPS2-M-GY		SU

Notes: Perimeter/meeting stile seals by frame/door supplier.

# Set: 9.0

Doors: B100AB, B100AC

1	Continuous Hinge	CFM_SLF-HD1 PT - DOOR HEIGHT		PE
1	Exit Device (rim, exit only)	ED5200 EO M92	630	RU
1	Door Pull	BF158 Mtg-Type 12XHD	US32D	RO
1	Surf Overhead Stop	8-336	630	RF
1	Surface Closer	J7500	689	NO
1	Threshold	272A MSES25SS		PE
1	Rain Guard	346C		PE
1	Sweep	3452CNB		PE
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C LENGTH TO SUIT		MK
1	Electric Power Transfer	EL-CEPT		SU
1	Door Position Switch	DPS2-M-GY		SU

Notes: Perimeter/meeting stile seals by frame/door supplier.

#### Set: 10.0

Doors: A100A, E100HF

2	Continuous Hinge	CFM_SLF-HD1 PT - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, exit only)	ED5200 EO M92	630	RU
1	Access Control Exit Device (SELP10)	ED5200N K157 MELR SELP10 IPS 24AD	630	RU
2	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
2	Door Pull	BF158 Mtg-Type 12XHD	US32D	RO
2	Surf Overhead Stop	8-336	630	RF
2	Surface Closer	J7500	689	NO
1	Threshold	272A MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	5110BL		PE
2	Sweep	3452CNB		PE
2	Frame Harness	QC-C1500P		MK
3	Door Harness	QC-C LENGTH TO SUIT		MK
2	Electric Power Transfer	EL-CEPT		SU
2	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Perimeter/meeting stile seals by frame/door supplier.

Electronic Operation: Valid card, remote release signal or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

# Set: 11.0

# Doors: A100DA, B100AA, C100AA, C100CC, C100GB, E100AA, E100JA, E101HH

2	Continuous Hinge	CFM_SLF-HD1 PT - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, exit only)	ED5200 EO M92	630	RU
1	Access Control Exit Device (SELP10)	ED5200N K157 MELR SELP10 IPS 24AD	630	RU
2	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
2	Door Pull	BF158 Mtg-Type 12XHD	US32D	RO
2	Surf Overhead Stop	8-336	630	RF
2	Surface Closer	J7500	689	NO
1	Threshold	272A MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	5110BL		PE
2	Sweep	3452CNB		PE
2	Frame Harness	QC-C1500P		MK
3	Door Harness	QC-C LENGTH TO SUIT		MK
2	Electric Power Transfer	EL-CEPT		SU
2	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Perimeter/meeting stile seals by frame/door supplier.

Electronic Operation: Valid card or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

#### Set: 12.0

# Doors: A100H, B100M, E100DA, E100FA

2	Continuous Hinge	CFM_SLF-HD1 PT - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, exit only)	ED5200 EO M92	630	RU
1	Access Control Exit Device (SELP10)	ED5200N K157 MELR SELP10 IPS 24AD	630	RU
2	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
2	Interchangeable Core	8027	630	RU
2	Door Pull	BF158 Mtg-Type 12XHD	US32D	RO
2	Surface Closer	CPS7500	689	NO
1	Threshold	272A MSES25SS		PE
1	Rain Guard	346C		PE

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1	Gasketing	5110BL	PE
2	Sweep	3452CNB	PE
2	Astragal	297AS	PE
2	Frame Harness	QC-C1500P	MK
3	Door Harness	QC-C LENGTH TO SUIT	MK
2	Electric Power Transfer	EL-CEPT	SU
2	Door Position Switch	DPS2-M-GY	SU
1	Lock Power	BY SECURITY	

Notes: Perimeter seals by frame supplier.

Electronic Operation: Valid card or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

# Set: 13.0

# Doors: B199GB, B199JB

2	Continuous Hinge	CFM_SLF-HD1 - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
2	Exit Device (rim, exit only)	ED5200 EO	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Door Pull	BF158 Mtg-Type 12XHD	US32D	RO
2	Surf Overhead Stop	8-336	630	RF
2	Surface Closer	J7500	689	NO
1	Threshold	272A MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	5110BL		PE
2	Sweep	3452CNB		PE
2	Door Position Switch	DPS2-M-GY		SU

Notes: Perimeter/meeting stile seals by frame/door supplier.

#### Set: 14.0

# Doors: D122A, D122B

2	Continuous Hinge	CFM_SLF-HD1 - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
2	Exit Device (rim, exit only)	ED5200 EO	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Surf Overhead Stop	8-336	630	RF

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2	Surface Closer	J7500	689	NO
1	Threshold	272A MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	5110BL		PE
2	Sweep	3452CNB		PE
2	Door Position Switch	DPS2-M-GY		SU

Notes: Perimeter/meeting stile seals by frame/door supplier.

# Set: 15.0

# Doors: C100FA, C107B

2	Continuous Hinge	CFM_SLF-HD1 - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, exit only)	ED5200 EO	630	RU
1	Exit Device (rim, nightlatch)	ED5200 K157 x LC	630	RU
2	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
2	Interchangeable Core	8027	630	RU
2	Door Pull	BF158 Mtg-Type 12XHD	US32D	RO
2	Surface Closer	CPS7500	689	NO
1	Threshold	272A MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	5110BL		PE
2	Sweep	3452CNB		PE
2	Astragal	297AS		PE
2	Door Position Switch	DPS2-M-GY		SU

Notes: Perimeter seals by frame supplier.

# Set: 16.0

# Doors: A100M, A125B, A125C, A199BB, A199CB, B199HB, B199KB, D118A, E101G, E101H, E101I, E101J, E101K, E101L, E101M

2	Continuous Hinge	CFM_SLF-HD1 - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
2	Exit Device (rim, exit only)	ED5200 EO	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Surface Closer	CPS7500	689	NO
1	Threshold	272A MSES25SS		PE
1	Rain Guard	346C		PE

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1	Gasketing	5110BL	PE
2	Sweep	3452CNB	PE
2	Astragal	297AS	PE
2	Door Position Switch	DPS2-M-GY	SU

Notes: Perimeter seals by frame supplier.

# Set: 17.0

Doors: 108A, 108B, C120B, C126B, D101, E101BA

1	Continuous Hinge	CFM_SLF-HD1 - DOOR HEIGHT		PE
1	Exit Device (rim, exit only)	ED5200 EO	630	RU
1	Surface Closer	CPS7500	689	NO
1	Threshold	272A MSES25SS		PE
1	Rain Guard	346C		PE
1	Sweep	3452CNB		PE
1	Door Position Switch	DPS2-M-GY		SU

Notes: Perimeter seals by frame supplier.

# Set: 18.0

Doors: FH101D

1	Continuous Hinge	CFM_HD1 PT - DOOR HEIGHT		PE
1	Access Control Exit Device (SELP10)	ED5200N K157 MELR SELP10 IPS 24AD	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Door Pull	BF158 Mtg-Type 12XHD	US32D	RO
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Threshold	279x224AFGT MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	S773BL		PE
1	Sweep	3452CNB		PE
1	Frame Harness	QC-C1500P		MK
2	Door Harness	QC-C LENGTH TO SUIT		MK
1	Electric Power Transfer	EL-CEPT		SU
1	Lock Power	BY SECURITY		

Notes: Electronic Operation: Valid card or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

# Set: 19.0

1	Continuous Hinge	CFM_HD1 - DOOR HEIGHT		PE
1	Exit Device (rim, nightlatch)	ED5200 K157 x LC	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Door Pull	BF158 Mtg-Type 12XHD	US32D	RO
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Threshold	279x224AFGT MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	S773BL		PE
1	Sweep	3452CNB		PE
1	Door Position Switch	DPS2-M-GY		SU

# <u>Set: 20.0</u>

# Doors: FH50A, FH51

2	Continuous Hinge	CFM_HD1 - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
2	Exit Device (rim, exit only)	ED5200 EO	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Door Pull	BF158 Mtg-Type 12XHD	US32D	RO
2	Surface Closer	CPS7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
1	Threshold	272A MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	S773BL		PE
1	Gasketing	5110BL		PE
2	Sweep	3452CNB		PE
2	Astragal	297AS		PE
2	Door Position Switch	DPS2-M-GY		SU

# Set: 21.0

2	Continuous Hinge	CFM_HD1 - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, exit only)	ED5200 EO	630	RU
1	Trim	D3080-02 Cyl	US32D	RI

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2	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
2	Surface Closer	CPS7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
1	Threshold	279x224AFGT MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	S773BL		PE
2	Sweep	3452CNB		PE

Notes: \*\*\*SET NOT USED\*\*\*

#### Set: 22.0

Doors: FH40, FH46, GH100

1	Continuous Hinge	CFM_HD1 - DOOR HEIGHT		PE
1	Continuous Hinge	CFM_HD1 PT - DOOR HEIGHT		PE
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Access Control Mort Lock	ML20606 x SELP10-SEC LSA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Coordinator	1700	Black	RO
2	Surface Closer	CPS7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
1	Threshold	279x224AFGT MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	S773BL		PE
2	Sweep	3452CNB		PE
1	Astragal	S771C		PE
1	Astragal	357SP		PE
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C LENGTH TO SUIT		MK
1	Electric Power Transfer	EL-CEPT		SU
2	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

# Set: 22.1

Doors: FH43

1	Continuous Hinge	CFM_	_HD1 PT - DOOR HEIGHT	PE
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1	Access Control Mort Lock	ML20606 x SELP10-SEC LSA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Coordinator	1700	Black	RO
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Threshold	279x224AFGT MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	S773BL		PE
1	Sweep	3452CNB		PE
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C LENGTH TO SUIT		MK
1	Electric Power Transfer	EL-CEPT		SU
1	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

#### Set: 23.0

#### Doors: A301, B128B, D100BB, GH101

1	Continuous Hinge	CFM_SLF-HD1 - DOOR HEIGHT		PE
1	Continuous Hinge	CFM_SLF-HD1 PT - DOOR HEIGHT		PE
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Access Control Mort Lock	ML20606 x SELP10-SEC LSA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Surface Closer	CPS7500	689	NO
1	Threshold	279x224AFGT MSES25SS		PE
1	Rain Guard	346C		PE
2	Sweep	3452CNB		PE
1	Astragal	S771C		PE
1	Astragal	357SP		PE
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C LENGTH TO SUIT		MK
1	Electric Power Transfer	EL-CEPT		SU
2	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Perimeter/meeting stile seals by frame/door supplier.

Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Free egress at all times. In

case of power loss, door remains locked and latched.

#### <u>Set: 24.0</u>

# Doors: B125A, B127A, B129A, B135A, B136B, B137B, B138B, D120A, GH102

1	Continuous Hinge	CFM SLF-HD1 PT - DOOR HEIGHT		PE
1	Access Control Mort Lock	ML20606 x SELP10-SEC LSA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	CPS7500	689	NO
1	Threshold	279x224AFGT MSES25SS		PE
1	Rain Guard	346C		PE
1	Sweep	3452CNB		PE
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C LENGTH TO SUIT		MK
1	Electric Power Transfer	EL-CEPT		SU
1	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Perimeter/meeting stile seals by frame/door supplier.

Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

#### Set: 25.0

#### Doors: A135AB, D110A

1	Continuous Hinge	CFM SLF-HD1 PT - DOOR HEIGHT		PE
1	Access Control Mort Lock	ML20606 x SELP10-SEC LSA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	CPS7500T	689	NO
1	Threshold	279x224AFGT MSES25SS		PE
1	Rain Guard	346C		PE
1	Sweep	3452CNB		PE
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C LENGTH TO SUIT		MK
1	Electric Power Transfer	EL-CEPT		SU
1	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Perimeter/meeting stile seals by frame/door supplier.

Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

# <u>Set: 26.0</u>

# Doors: B301-1, FH49, PB100AA, PB100AB

2	Continuous Hinge	CFM_HD1 - DOOR HEIGHT		PE
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Surface Closer	CPS7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
1	Threshold	279x224AFGT MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	S773BL		PE
2	Sweep	3452CNB		PE
1	Astragal	S771C		PE
1	Astragal	357SP		PE
2	Door Position Switch	DPS2-M-GY		SU

#### Set: 27.0

# Doors: C104D, FH47, GH104

2	Continuous Hinge	CFM_HD1 - DOOR HEIGHT		PE
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Surface Closer	CPS7500T	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
1	Threshold	279x224AFGT MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	S773BL		PE
2	Sweep	3452CNB		PE
1	Astragal	S771C		PE
1	Astragal	357SP		PE
2	Door Position Switch	DPS2-M-GY		SU

# Notes: EXTERIOR STORAGE X KEY ACCESS (HM/SINGLE)

#### Set: 28.0

Doors: C204, D117, E201A, MB100A

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1	Continuous Hinge	CFM_HD1 - DOOR HEIGHT		PE
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Threshold	279x224AFGT MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	S773BL		PE
1	Sweep	3452CNB		PE
1	Door Position Switch	DPS2-M-GY		SU

Notes: EXTERIOR STORAGE X KEY ACCESS (HM/SINGLE)

#### Set: 29.0

# Doors: B120A

2	Continuous Hinge	CFM_HD1 - DOOR HEIGHT		PE
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Surface Closer	CPS7500	689	NO
1	Threshold	279x224AFGT MSES25SS		PE
1	Rain Guard	346C		PE
1	Gasketing	S773BL		PE
2	Sweep	3452CNB		PE
1	Astragal	S771C		PE
1	Astragal	357SP		PE
2	Door Position Switch	DPS2-M-GY		SU

Notes: Perimeter seals by frame supplier.

#### 2 Continuous Hinge CFM SLF-HD1 PT - DOOR HEIGHT PE 1 Removable Mullion 907BKM - DOOR HEIGHT RU ED5200 EO M92 2 Exit Device (rim, exit only) 630 RU 1 Cylinder (type to suit) 1080 (or) 3080 CT6R 630 RU 1 Interchangeable Core 8027 630 RU 2 Door Pull BF158 Mtg-Type 12XHD US32D RO

Set: 30.0

Doors: B100BB
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2	Surf Overhead Stop	8-336	630	RF
2	Surface Closer	J7500	689	NO
1	Gasketing	5110BL		PE
2	Frame Harness	QC-C1500P		MK
2	Door Harness	QC-C LENGTH TO SUIT		MK
2	Electric Power Transfer	EL-CEPT		SU
2	Door Position Switch	DPS2-M-GY		SU

Notes: Perimeter/meeting stile seals by frame/door supplier.

#### Set: 31.0

#### Doors: A100B

Continuous Hinge	CFM_SLF-HD1 PT - DOOR HEIGHT		PE
Removable Mullion	907BKM - DOOR HEIGHT		RU
Exit Device (rim, exit only)	ED5200 EO M92	630	RU
Access Control Exit Device (SELP10)	ED5200N K157 MELR SELP10 IPS 24AD	630	RU
Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
Door Pull	BF158 Mtg-Type 12XHD	US32D	RO
Surf Overhead Stop	8-336	630	RF
Surface Closer	J7500	689	NO
Gasketing	5110BL		PE
Frame Harness	QC-C1500P		MK
Door Harness	QC-C LENGTH TO SUIT		MK
Electric Power Transfer	EL-CEPT		SU
Door Position Switch	DPS2-M-GY		SU
Lock Power	BY SECURITY		
	Continuous Hinge Removable Mullion Exit Device (rim, exit only) Access Control Exit Device (SELP10) Cylinder (type to suit) Door Pull Surf Overhead Stop Surface Closer Gasketing Frame Harness Door Harness Electric Power Transfer Door Position Switch Lock Power	Continuous HingeCFM_SLF-HD1 PT - DOOR HEIGHTRemovable Mullion907BKM - DOOR HEIGHTExit Device (rim, exit only)ED5200 EO M92Access Control Exit Device (SELP10)ED5200N K157 MELR SELP10 IPS 24ADCylinder (type to suit)1080 (or) 3080 CT6RDoor PullBF158 Mtg-Type 12XHDSurf Overhead Stop8-336Surface CloserJ7500Gasketing5110BLFrame HarnessQC-C1500PDoor HarnessEL-CEPTDoor Position SwitchDPS2-M-GYLock PowerBY SECURITY	Continuous HingeCFM_SLF-HD1 PT - DOOR HEIGHTRemovable Mullion907BKM - DOOR HEIGHTExit Device (rim, exit only)ED5200 EO M92Access Control Exit Device (SELP10)ED5200N K157 MELR SELP10 IPS 24ADCylinder (type to suit)1080 (or) 3080 CT6RDoor PullBF158 Mtg-Type 12XHDSurf Overhead Stop8-336Surface CloserJ7500Gasketing5110BLFrame HarnessQC-C1500PDoor HarnessQC-C LENGTH TO SUITElectric Power TransferEL-CEPTDoor Position SwitchDPS2-M-GYLock PowerBY SECURITY

Notes: Perimeter/meeting stile seals by frame/door supplier.

Electronic Operation: Valid card, remote release signal or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

#### Set: 32.0

#### Doors: B100BA

2	Continuous Hinge	CFM_SLF-HD1 PT - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, exit only)	ED5200 EO M92	630	RU
1	Access Control Exit Device (SELP10)	ED5200N K157 MELR SELP10 IPS 24AD	630	RU
2	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
2	Surf Overhead Stop	8-336	630	RF

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2	Surface Closer	J7500	689	NO
1	Gasketing	5110BL		PE
2	Frame Harness	QC-C1500P		MK
3	Door Harness	QC-C LENGTH TO SUIT		MK
2	Electric Power Transfer	EL-CEPT		SU
2	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Perimeter/meeting stile seals by frame/door supplier.

Electronic Operation: Valid card or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

#### <u>Set: 33.0</u>

## Doors: A101B, B102A

1	Continuous Hinge	CFM_SLF-HD1 PT - DOOR HEIGHT		PE
1	Access Control Mort Lock	ML20606 x SELP10-SEC LSA CT6R	630	RU
1	Deadbolt	DL2217 CT6	626	RU
2	Interchangeable Core	8027	630	RU
1	Surface Closer	2800ST	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C LENGTH TO SUIT		MK
1	Electric Power Transfer	EL-CEPT		SU
1	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Perimeter/meeting stile seals by frame/door supplier.

Deadbolt to secure office after hours.

Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

#### Set: 34.0

#### Doors: A101A, B102B

1	Continuous Hinge	CFM_SLF-HD1 PT - DOOR HEIGHT		PE
1	Access Control Mort Lock	ML20606 x SELP10-SEC LSA CT6R	630	RU
1	Deadbolt	DL2217 CT6	626	RU
2	Interchangeable Core	8027	630	RU
1	Surface Closer	2800ST	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Frame Harness	QC-C1500P		MK

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1	Door Harness	QC-C LENGTH TO SUIT	MK
1	Electric Power Transfer	EL-CEPT	SU
1	Door Position Switch	DPS2-M-GY	SU
1	Desktop Door Control	DTC-M2-D-6-A-G-V1	AK
1	Lock Power	BY SECURITY	

Notes: Perimeter/meeting stile seals by frame/door supplier.

Deadbolt to secure office after hours.

Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

#### Set: 35.0

Doors: E100BE, E100BF

2	Continuous Hinge	CFM_SLF-HD1 - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, dummy trim)	ED5200 L950	630	RU
1	Exit Device (rim, storeroom)	ED5200 L957	630	RU
2	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
2	Interchangeable Core	8027	630	RU
2	Surf Overhead Stop	8-336	630	RF
2	Surface Closer	J7500	689	NO
1	Gasketing	5110BL		PE

Notes: Perimeter/meeting stile seals by frame/door supplier.

## Set: 36.0

## Doors: B109, B113, C132A, C210B, C210C

1	Continuous Hinge	CFM_SLF-HD1 - DOOR HEIGHT		PE
1	Mortise Deadlock	MS185_ Schoolhouse Function	628	AD
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Cylinder (thumbturn)	4066 - LENGTH/CAM TO SUIT	130	AD
1	Push Bar & Pull	BF15847 T1	US32D	RO
1	Surface Closer	2800ST	689	NO

Notes: Perimeter/meeting stile seals by frame/door supplier.

## Set: 37.0

Doors: A100CA, C100BA, C100BB, C100BC, C100BD, C100BE, C100BF, C100GA, E100BA, E100BB, E100BC, E100BD, E100HA, E100HB, E100HC, E100HD, E100HE

2	Continuous Hinge	CFM_HD1 - DOOR HEIGHT		PE
2	Push Bar & Pull	BF15847 T1	US32D	RO
2	Surf Overhead Stop	8-336	630	RF
2	Surface Closer	J7500	689	NO

Notes: Perimeter/meeting stile seals by frame/door supplier.

## Set: 38.0

## Doors: A100CB

2	Continuous Hinge	CFM_SLF-HD1 - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
2	Exit Device (rim, exit only)	ED5200 EO	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Surf Overhead Stop	8-336	630	RF
2	Surface Closer	J7500	689	NO
1	Gasketing	5110BL		PE

Notes: Perimeter/meeting stile seals by frame/door supplier.

#### Set: 39.0

#### Doors: C210

2	Continuous Hinge	CFM_SLF-HD1 - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, dummy trim)	ED5200 L950	630	RU
1	Exit Device (rim, storeroom)	ED5200 L957	630	RU
2	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
2	Interchangeable Core	8027	630	RU
2	Surface Closer	CPS7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
1	Gasketing	5110BL		PE
2	Astragal	297AS		PE

Notes: Perimeter seals by frame supplier.

## Set: 40.0

Doors: A102, B101

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1	Continuous Hinge	CFM_SLF-HD1 - DOOR HEIGHT		PE
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Door Stop	403 (or) 441CU	US26D	RO

Notes: Perimeter/meeting stile seals by frame/door supplier.

#### Set: 41.0

Doors: B104

1	Continuous Hinge	CFM_SLF-HD1 - DOOR HEIGHT		PE
1	Classroom Lock	ML2055 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	2800ST	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO

Notes: Perimeter seals by frame supplier.

#### Set: 42.0

#### Doors: D118, D122C, E120A, E120B

6	Hinge (heavy weight)	T4A3786	US26D	MK
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, dummy trim)	ED5200 L950	630	RU
1	Exit Device (rim, storeroom)	ED5200 L957	630	RU
2	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
2	Interchangeable Core	8027	630	RU
2	Surface Closer	R7500 (or) PR7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
2	Door Stop	403 (or) 441CU	US26D	RO
1	Gasketing	S773BL		PE
1	Gasketing	5110BL		PE

## Set: 43.0

## Doors: A125A, A125D, C100D, C100K, C101AA, C101DA, C101E, C101F, C120A, C200A, C200G, D121A, D121B, E101A, E101B, E101C, E101D, E101E, E101F, E101G, E101K, E101N, E201

6	Hinge (heavy weight)	T4A3786	US26D	MK
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, dummy trim)	ED5200 L950	630	RU
1	Exit Device (rim, storeroom)	ED5200 L957	630	RU

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2	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
2	Interchangeable Core	8027	630	RU
2	Surface Closer	CPS7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
1	Gasketing	S773BL		PE
1	Gasketing	5110BL		PE
2	Astragal	297AS		PE

## Set: 44.0

## Doors: C104BA, E199LB

8	Hinge (heavy weight)	T4A3786	US26D	MK
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, exit only)	ED5200A EO	630	RU
1	Exit Device (rim, nightlatch)	ED5200A L957	630	RU
2	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
2	Interchangeable Core	8027	630	RU
2	Surface Closer	CLP7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
1	Gasketing	S88BL		PE
1	Gasketing	5110BL		PE
2	Astragal	297AS		PE

## Set: 45.0

## Doors: C103AA, C103CA, C199DB

4	Hinge (heavy weight)	T4A3786	US26D	MK
1	Exit Device (rim, storeroom)	ED5200 L957	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Gasketing	S773BL		PE

## <u>Set: 46.0</u>

## Doors: C099D, C099E, C199CA, C199DA, C299DB, C299EB

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Exit Device (rim, classroom)	ED5200A L955	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU

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1	Surface Closer	R7500 (or) PR7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
1	Gasketing	S773BL		PE
		<u>Set: 47.0</u>		
D	oors: C113			
3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Exit Device (rim classroom)	ED5200A I 955	630	
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Gasketing	\$773BL	0.0020	PE
		<u>Set: 48.0</u>		
D	oors: D100B			
6	Hinge (heavy weight)	T4A3786	US26D	MK
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, passage)	ED5200 L910	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Surface Closer	R7500 (or) PR7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
2	Door Stop	403 (or) 441CU	US26D	RO
1	Gasketing	5110BL		PE
2	Silencer	608 (or) 609		RO
D	oors: C199C	<u>Set: 49.0</u>		
D	0013. 01770			
6	Hinge (heavy weight)	T4A3786	US26D	MK
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
2	Exit Device (rim, passage)	ED5200A L910	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Surface Closer	R7500 (or) PR7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
2	Door Stop	403 (or) 441CU	US26D	RO

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1	Gasketing	S88BL	PE
1	Gasketing	5110BL	PE
2	Astragal	297AS	PE

## <u>Set: 50.0</u>

## Doors: B299M, C003, C102D, C102G, C299DA

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Exit Device (rim, passage)	ED5200A L910	630	RU
1	Surface Closer	R7500 (or) PR7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
1	Gasketing	S88BL		PE

### Set: 51.0

## Doors: C100F, C100J, C100LA

2	Continuous Hinge	CFM_HD1 - DOOR HEIGHT		PE
1	Removable Mullion	907BKM - DOOR HEIGHT		RU
1	Exit Device (rim, dummy trim)	ED5200 L950	630	RU
1	Exit Device (rim, storeroom)	ED5200 L957	630	RU
3	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
3	Interchangeable Core	8027	630	RU
2	Surface Closer	CPS7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
1	Gasketing	S773BL		PE
1	Gasketing	5110BL		PE
2	Astragal	297AS		PE

#### Set: 52.0

## Doors: FH35, FH36, FH42, FH45

5	Hinge (heavy weight)	T4A3786	US26D	MK
1	Electric Hinge (heavy weight)	T4A3786-QC12	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	2842 (or) 2942	US26D	RO
1	Access Control Mort Lock	ML20606 x SELP10-SEC LSA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Coordinator	1700	Black	RO
2	Surface Closer	R7500 (or) PR7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO

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2	Door Stop	403 (or) 441CU	US26D	RO
2	Silencer	608 (or) 609		RO
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C LENGTH TO SUIT		MK
2	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Card reader by security integrator.

Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

#### Set: 53.0

Doors: E101DA

5	Hinge (heavy weight)	T4A3786	US26D	MK
1	Electric Hinge (heavy weight)	T4A3786-QC12	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt	2842 (or) 2942	US26D	RO
1	Access Control Mort Lock	ML20606 x SELP10-SEC LSA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Coordinator	1700	Black	RO
2	Surface Closer	CPS7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
2	Silencer	608 (or) 609		RO
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C LENGTH TO SUIT		MK
2	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Card reader by security integrator.

Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

#### Set: 54.0

Doors: B102N, B103A, B154, B204A, B254A, C101BA, C103AB, C103F, C208, D116, E101DA, E102, E103A, E108A

2	Hinge (heavy weight)	T4A3786	US26D	MK
1	Electric Hinge (heavy weight)	T4A3786-QC12	US26D	MK
1	Access Control Mort Lock	ML20606 x SELP10-SEC LSA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	R7500 (or) PR7500	689	NO

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1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
3	Silencer	608 (or) 609		RO
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C LENGTH TO SUIT		MK
1	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Card reader by security integrator.

Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

#### <u>Set: 55.0</u>

## Doors: A118, A218, A230, C134

2	Hinge (heavy weight)	T4A3786	US26D	MK
1	Electric Hinge (heavy weight)	T4A3786-QC12	US26D	MK
1	Access Control Mort Lock	ML20606 x SELP10-SEC LSA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
3	Silencer	608 (or) 609		RO
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C LENGTH TO SUIT		MK
1	Door Position Switch	DPS2-M-GY		SU
1	Lock Power	BY SECURITY		

Notes: Card reader by security integrator.

Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

#### Set: 55.1

#### Doors: A131

3	Hinge (heavy weight)	T4A3786	US26D	MK
3	Electric Hinge (heavy weight)	T4A3786-QC12	US26D	MK
1	Access Control Mort Lock	ML20606 x SELP10-SEC LSA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Gasketing	S88BL		PE
1	Frame Harness	QC-C1500P		MK

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1 Door Harness	QC-C LENGTH TO SUIT	MK
1 Door Position Swite	n DPS2-M-GY	SU
1 Lock Power	BY SECURITY	

Notes: Card reader by security integrator.

Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Free egress at all times. In case of power loss, door remains locked and latched.

## <u>Set: 56.0</u> Doors: C105, C106, C109, D111A, D115, E101AA, E101EA, E101FA, E101JA, E201AA

1	II.			MIZ
6	Hinge	1A2/14	US26D	MK
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Door Stop	403 (or) 441CU	US26D	RO
2	Silencer	608 (or) 609		RO

#### Set: 56.1

Doors: E101AA

7	Hinge	TA2714	US26D	MK
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Surface Bolt (dutch door)	630-4	US26D	RO
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
3	Door Stop	403 (or) 441CU	US26D	RO
2	Silencer	608 (or) 609		RO

Notes: Dutch door on active leaf only.

#### Set: 57.0

Doors: A111, A125AA, A137A, A137B, A236A, A236B, B105AA, B105AB, B149A, B149B, B209AA, B209AB, B248AA, B248AB, C122, C126A, C207, E101CA, E101FA, E101GB, E104A, E109A, E122A, E122B, GH103

6	Hinge	TA2714	US26D	MK
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Storeroom Lock	ML2057 LWA CT6R	630	RU

Fa H	airview Campus – New Middle and ligh School	Bid Package E – Outbuil	Appoquinimink School Distri Bid Package E – Outbuildings, Fields and Finish Sitewor		
1	Interchangeable Core	8027	630	RU	
2	Surf Overhead Stop	10-X36	652	RF	
2	Silencer	608 (or) 609		RO	
Л	oom: C1044A	<u>Set: 58.0</u>			
D	00fs: C104AA				
6	Hinge	TA2714	US26D	MK	
1	Dust Proof Strike	570	US26D	RO	
1	Flush Bolt	2842 (or) 2942	US26D	RO	

ML2057 LWA CT6R

8027

1700

**CLP7500** 

S88BL

S771C

357SP

Set:	59.0
Sec.	0/10

K1050 10" BEV

Doors: A101CA, A101CB, A101D, A101E, A101G, A101H, A101K, A101M, A101N, A101R, A102D, A103A, A103B, A104, A105, A106A, A106B, A108, A109, A110, A112, A113, A114A, A114B, A115, A119, A125E, A125F, A129A, A130, A134, A135A, A136, A138, A139, A140, A141, A142, A201AA, A201AB, A201C, A202A, A202B, A204, A205B, A205C, A206, A207, A208A, A208B, A210, A211, A212, A213, A214, A215A, A215B, A216, A217, A229, A233, A234A, A234B, A235, A237, A237A, A238, A239, A240, A242A, A242B, A243, A244, B101C, B101L, B101L, B101LA, B101N, B101P, B101S, B102D, B102DA, B102E, B102F, B102FA, B102H, B102J, B102L, B102M, B104B, B104C, B104F, B104G, B104H, B104J, B104K, B104L, B104M, B104O, B107, B108, B108A, B108B, B108D, B111, B111A, B112A, B112B, B115, B116, B120, B122, B123, B124, B125, B127, B128, B129, B135, B136, B136A, B137, B137CA, B138, B139, B140, B141, B142, B143, B144, B145, B146, B147, B148, B150, B151, B152, B153, B203, B205, B206, B207, B208, B208A, B209, B210, B210A, B211, B212, B213, B214, B215, B216, B217, B218, B219, B220, B221, B222, B223, B224A, B225A, B226A, B227A, B227B, B228A, B228B, B229A, B229B, B230A, B230B, B236A, B236B, B238, B239, B240, B241, B242, B243, B244, B245, B246, B247, B248, B249, B250, B251, B252, B253, B254, B255, C102S, C125, C128, C130, C131, C210AA, C210AB, C210D, C298D, D108, D113A, D119, D119A, D120, E101BB, E119, E121, E123, E124, FH02A, FH02B, FH100, FH38, FH38A, FH45B, FH48, FH52, MB101

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Door Stop	403 (or) 441CU	US26D	RO
3	Silencer	608 (or) 609		RO

630

630

689

Black

US32D

RU

RU

RO

NO

RO

PE

PE

PE

1 Storeroom Lock

1 Coordinator

2 Kick Plate

1 Gasketing

1 Astragal

1 Astragal

2 Surface Closer

1 Interchangeable Core

#### <u>Set: 60.0</u>

Doors: B104P, B137A, B138A, C120C, C124A, C124B, C132B, D105B, D105CA, D113B, E101CB, E101GA, FH06, FH07

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surf Overhead Stop	10-X36	652	RF
3	Silencer	608 (or) 609		RO

#### Set: 61.0

Doors: A101P, A101Q, A101S, A107, A116, A120, A123, A132, A208AA, A220, A222, A225, A228, A232, A242AA, B104Q, B114, B121, B134, B160, B204, B224AA, B231, B237, C002, C006, C101CA, C129, C132, C133, C136, C137, C198A, C198B, C201B, C201C, C201D, C201H, C201KA, C201KB, C201LA, C201LB, C205, C301AA, C301AB, C301BA, C302AA, C302BA, C399DA, C399EA, D102A, E101EA, E101EB, E101IA, E115, E116

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	R7500 (or) PR7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
3	Silencer	608 (or) 609	GRY	RO

#### Set: 61.1

Doors: B301-2

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	R7500 (or) PR7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
1	Threshold	166A MSES10SS		PE
1	Gasketing	S88BL		PE
1	Sweep	315CN		PE

#### Set: 62.0

#### Doors: D110B

3	Hinge	TA2714	US26D	MK

Fairview Campus – New Middle and High School

1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Door Closer	R7500H (or) PR7500H	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
3	Silencer	608 (or) 609		RO
1	Door Position Switch	DPS2-M-GY		SU

## Notes: INTERIOR STORAGE/MECH X KEY ACCESS (WD-HM/SINGLE)

#### Set: 63.0

#### Doors: A212A, B233, C112, C123, C135

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	CLP7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
3	Silencer	608 (or) 609		RO

## Notes: INTERIOR STORAGE/MECH X KEY ACCESS (WD-HM/SINGLE)

## <u>Set: 64.0</u>

## Doors: A128, A299N, C005, C102B, C104A, C299EA

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	R7500 (or) PR7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
1	Gasketing	S88BL		PE

## Notes: INTERIOR STORAGE/MECH X KEY ACCESS (WD-HM/SINGLE)

#### Set: 64.1

### Doors: A124, B119, B131

3	Hinge	TA2714	US26D	MK
1	Storeroom Lock	ML2057 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU

Appoquinimink School District Bid Package E – Outbuildings, Fields and Finish Sitework		Fairview Campus – 1	New Middl High S	e and chool	
1	Surface Closer	CLP7500		689	NO
1	Kick Plate	K1050 10" BEV		US32D	RO
1	Gasketing	S88BL			PE

## Notes: INTERIOR STORAGE/MECH X KEY ACCESS (WD-HM/SINGLE)

## Set: 65.0

# Doors: A101L, A101PA, A102B, A102F, B101A, B101B, B101D, B101G, B101J, B101R, B101T, B102C, B102CA, B102I, B104A, B104E, B104I, B108C

3	Hinge	TA2714	US26D	MK
1	Passage Latch	ML2010 LWA	630	RU
1	Door Stop	403 (or) 441CU	US26D	RO
3	Silencer	608 (or) 609		RO
		<u>Set: 65.1</u>		
D	bors: A102A			
(		T + 0714		N 417
6	Hinge	1 A2/14	US26D	MK
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Passage Latch	ML2010 LWA	630	RU
2	Surf Overhead Stop	10-X36	652	RF
2	Silencer	608 (or) 609		RO
F	<b>D102</b>	<u>Set: 65.2</u>		
D	bors: B103			
3	Hinge	TA2714	US26D	MK
1	Passage Latch	ML2010 LWA	630	RU
1	Surf Overhead Stop	10-X36	652	RF
3	Silencer	608 (or) 609		RO
		<u>Set: 66.0</u>		
D	bors: A101C, B102NA, B104N			
3	Hinge	TA2714	US26D	MK
1	Passage Latch	ML2010 LWA	630	RU
1	Surface Closer	R7500 (or) PR7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO

Fairview Campus – New Middle and	I	Appoquinimink School District
High School	Bid Package E – Outbuildir	gs, Fields and Finish Sitework
C	C	
3 Silencer	608 (or) 609	RO

## Set: 66.1

## Doors: B102NB

3	Hinge	TA2714	US26D	MK
1	Passage Latch	ML2010 LWA	630	RU
1	Surface Closer	R7500 (or) PR7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
1	Gasketing	S88BL		PE

#### Set: 67.0

## Doors: B122A, B123A, B128A, B147A, B150A, B225B, B248A, B250A

3	Hinge	TA2714	US26D	MK
1	Store Door Lock	ML2022 LWA CT6R	630	RU
2	Interchangeable Core	8027	630	RU
1	Door Stop	403 (or) 441CU	US26D	RO
1	Gasketing	S773BL		PE

## <u>Set: 68.0</u>

Doors: A136A

6	Hinge	TA2714	US26D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Classroom Lock	ML2055 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Surf Overhead Stop	10-X36	652	RF
2	Silencer	608 (or) 609		RO

## Set: 69.0

Doors: A125BA

6	Hinge	TA2714	US26D	MK
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Classroom Lock	ML2055 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
2	Surface Closer	R7500 (or) PR7500	689	NO

ł	Bid Package E – Outbuildings, Fields and Finish Sitework			chool
2	Kick Plate	K1050 10" BEV	US32D	RO
2	Door Stop	403 (or) 441CU	US26D	RO
2	Silencer	608 (or) 609		RO

Fairview Campus - New Middle and

#### Set: 70.0

Doors: D105A

Appoquinimink School District

6	Hinge	TA2714	US26D	MK
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt (manual)	555 (or) 557	US26D	RO
1	Classroom Lock	ML2055 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Door Closer	R7500H (or) PR7500H	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
2	Door Stop	403 (or) 441CU	US26D	RO
2	Silencer	608 (or) 609		RO

#### Set: 71.0

## Doors: A102C, A102E, A135AA, B101H, B101Q, B106, B107A, B110C, B112AA, B112AB, B117, B118, B121A, B126, B134A, C107A

3	Hinge	TA2714	US26D	MK
1	Classroom Lock	ML2055 LWA CT6R	630	RU
1	Cylinder (type to suit)	1080 (or) 3080 CT6R	630	RU
1	Door Stop	403 (or) 441CU	US26D	RO
3	Silencer	608 (or) 609	GRY	RO

#### Notes: INTERIOR CLRM STORAGE X KEY ACCESS (WD-HM/SINGLE)

#### Set: 72.0

### Doors: A201B, A201D, B101K, B110D, D109

3	Hinge	TA2714	US26D	MK
1	Classroom Lock	ML2055 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surf Overhead Stop	10-X36	652	RF
3	Silencer	608 (or) 609		RO

#### Set: 73.0

#### Doors: A129B, B110A, B110B, B110E, C210A, D112, E101BA, E107A, E107B, E112A, E112B

Fairview Campus – New Middle and High School

3	Hinge	TA2714	US26D	MK
1	Classroom Lock	ML2055 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	R7500 (or) PR7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
3	Silencer	608 (or) 609		RO

Notes: INTERIOR STORAGE/MECH X KEY ACCESS (WD-HM/SINGLE)

<u>Set: 74.0</u> Doors: B109A, B109B, B201A, B201C, B202A, B202AA, B202AB, B202B, B224B, B256A, B256B, C118, C119

3	Hinge	TA2714	US26D	MK
1	Classroom Lock	ML2055 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	R7500 (or) PR7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
1	Gasketing	S88BL		PE

Notes: INTERIOR STORAGE/MECH X KEY ACCESS (WD-HM/SINGLE)

#### Set: 74.1

Doors: B204B, D105DA

3	Hinge	TA2714	US26D	MK
1	Classroom Lock	ML2055 LWA CT6R	630	RU
1	Interchangeable Core	8027	630	RU
1	Surface Closer	CLP7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Gasketing	S88BL		PE

Notes: INTERIOR STORAGE/MECH X KEY ACCESS (WD-HM/SINGLE)

## Set: 75.0

Doors: B101E, B101F

3	Hinge	TA2714	US26D	MK
1	Privacy Set	ML2060 LWA M19V	630	RU

Appoquinimink School District Bid Package E – Outbuildings, Fields and Finish Sitework

2	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
3	Silencer	608 (or) 609	GRY	RO

#### Notes: INTERIOR CLRM TOILET X PRIVACY (WD-HM/SINGLE)

#### Set: 75.1

Doors: A102G

3	Hinge	TA2714	US26D	MK
1	Privacy Set	ML2060 LWA M19V	630	RU
1	Surf Overhead Stop	10-X36	652	RF
1	Kick Plate	K1050 10" BEV	US32D	RO
3	Silencer	608 (or) 609		RO

#### Notes: INTERIOR CLRM TOILET X PRIVACY (WD-HM/SINGLE)

## <u>Set: 76.0</u> Doors: A101F, A101J, A125CA, A125H, A219, A231, B101M, B102G, B102K, B104D, B114A, B132, B136AA, B221A, B234, B237A, C209, D104A, D107A, E101GA, E101LA, E117A, E118A, GH105, MB102

3	Hinge	TA2714	US26D	MK
1	Privacy Set	ML2060 LWA M19V	630	RU
1	Surface Closer	R7500 (or) PR7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
3	Silencer	608 (or) 609	GRY	RO

#### Notes: INTERIOR CORR TOILET X PRIVACY (WD-HM/SINGLE)

#### Set: 77.0

Doors: A117, A133, C121, D114

3	Hinge	TA2714	US26D	MK
1	Privacy Set	ML2060 LWA M19V	630	RU
1	Surface Closer	CLP7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
3	Silencer	608 (or) 609		RO

#### Notes: INTERIOR CORR TOILET X PRIVACY (WD-HM/SINGLE)

## Set: 78.0

## Doors: B137AA, B137BA, B138AB, B138BB

2	Hinge	TA2714	US26D	MK
1	Passage Latch	ML2010 LWA	630	RU
1	Kick Plate	K1050 10" BEV	US32D	RO
2	Door Stop	403 (or) 441CU	US26D	RO
2	Silencer	608 (or) 609		RO

Set: 79.0

Notes: Dutch door with bottom leaf only.

Doors:	C198A

Hinge (heavy weight)	T4A3786	US26D	MK
Storeroom Lock	ML2057 LWA CT6R	630	RU
Interchangeable Core	8027	630	RU
Surface Closer	R7500 (or) PR7500	689	NO
Kick Plate	K1050 10" BEV	US32D	RO
Door Stop	403 (or) 441CU	US26D	RO
Gasketing	S88BL		PE
	Hinge (heavy weight) Storeroom Lock Interchangeable Core Surface Closer Kick Plate Door Stop Gasketing	Hinge (heavy weight)T4A3786Storeroom LockML2057 LWA CT6RInterchangeable Core8027Surface CloserR7500 (or) PR7500Kick PlateK1050 10" BEVDoor Stop403 (or) 441CUGasketingS88BL	Hinge (heavy weight)T4A3786US26DStoreroom LockML2057 LWA CT6R630Interchangeable Core8027630Surface CloserR7500 (or) PR7500689Kick PlateK1050 10" BEVUS32DDoor Stop403 (or) 441CUUS26DGasketingS88BLUS26D

#### Notes: INTERIOR STORAGE/MECH X KEY ACCESS (WD-HM/SINGLE)

#### <u>Set: 80.0</u>

## Doors: A125DA, A125GA, C114, C116, D104, D107, E101HA, E101KA, E105, E105A, E105B, E106A, E110, E110A, E110B, E111A, E113, E114, E117, E118

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Deadbolt	DL2217 CT6	626	RU
1	Interchangeable Core	8027	630	RU
1	Door Pull	BF Y110 Mtg-Type 1	US32D	RO
1	Push Plate	70G (4 x 20)	US32D	RO
1	Surface Closer	R7500 (or) PR7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
3	Silencer	608 (or) 609		RO

#### Set: 80.1

#### Doors: D102

4	Hinge (heavy weight)	T4A3786	US26D	MK
1	Deadbolt	DL2217 CT6	626	RU
1	Interchangeable Core	8027	630	RU
1	Door Pull	BF Y110 Mtg-Type 1	US32D	RO
1	Push Plate	70G (4 x 20)	US32D	RO
1	Surface Closer	CLP7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
3	Silencer	608 (or) 609		RO

## Set: 81.0

#### Doors: A100G, E100CA, E100EA

6	Hinge (heavy weight)	T4A3786	US26D	MK
2	Door Pull	BF Y110 Mtg-Type 1	US32D	RO
2	Push Plate	70G (4 x 20)	US32D	RO
2	Surface Closer	CPS7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
2	Silencer	608 (or) 609		RO

#### Set: 82.0

## Doors: C101A, C101B, C201A, C201E

Hinge (heavy weight)	T4A3786	US26D	MK
Door Pull	BF Y110 Mtg-Type 1	US32D	RO
Push Plate	70G (4 x 20)	US32D	RO
Surface Closer	CPS7500	689	NO
Kick Plate	K1050 10" BEV	US32D	RO
Gasketing	S773BL		PE
Astragal	297AS		PE
	Hinge (heavy weight) Door Pull Push Plate Surface Closer Kick Plate Gasketing Astragal	Hinge (heavy weight)T4A3786Door PullBF Y110 Mtg-Type 1Push Plate70G (4 x 20)Surface CloserCPS7500Kick PlateK1050 10" BEVGasketingS773BLAstragal297AS	Hinge (heavy weight)T4A3786US26DDoor PullBF Y110 Mtg-Type 1US32DPush Plate70G (4 x 20)US32DSurface CloserCPS7500689Kick PlateK1050 10" BEVUS32DGasketingS773BL297AS

## Set: 83.0

## Doors: C101D, C101EA, C102FA, C103C, C103D, C201F

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Door Pull	BF Y110 Mtg-Type 1	US32D	RO
1	Push Plate	70G (4 x 20)	US32D	RO
1	Surface Closer	R7500 (or) PR7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Door Stop	403 (or) 441CU	US26D	RO
1	Gasketing	S773BL		PE

## Set: 84.0

Doors: C102A, C201G

3	Hinge (heavy weight)	T4A3786	US26D	MK
1	Door Pull	BF Y110 Mtg-Type 1	US32D	RO
1	Push Plate	70G (4 x 20)	US32D	RO
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 10" BEV	US32D	RO
1	Gasketing	S773BL		PE

#### <u>Set: 85.0</u>

## Doors: FH42A, FH50

2	Continuous Hinge	CFM_HD1 - DOOR HEIGHT		PE
2	Door Pull	BF Y110 Mtg-Type 1	US32D	RO
2	Push Plate	70G (4 x 20)	US32D	RO
2	Surface Closer	R7500 (or) PR7500	689	NO
2	Kick Plate	K1050 10" BEV	US32D	RO
2	Door Stop	403 (or) 441CU	US26D	RO
1	Gasketing	S773BL		PE
2	Astragal	297AS		PE

## <u>Set: 86.0</u>

#### Doors: B200H CFM HD1 - DOOR HEIGHT 2 Continuous Hinge PE 2 Door Pull BF Y110 Mtg-Type 1 US32D RO 2 Push Plate 70G (4 x 20) US32D RO 2 Door Closer R7500H (or) PR7500H 689 NO 2 Kick Plate K1050 10" BEV US32D RO 2 Door Stop 403 (or) 441CU US26D RO 2 Silencer 608 (or) 609 RO

## **END OF SECTION**

## **SECTION 08 1113**

## HOLLOW METAL DOORS AND FRAMES

#### PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Non-fire-rated hollow metal doors and frames.
  - B. Hollow metal frames for wood doors.
  - C. Fire-rated hollow metal doors and frames.
  - D. Thermally insulated hollow metal doors with frames.
  - E. Hollow metal borrowed lites glazing frames.
- 1.02 RELATED REQUIREMENTS
  - A. Section 08 7100 Door Hardware.
  - B. Section 08 8000 Glazing: Glass for doors and borrowed lites.
- 1.03 ABBREVIATIONS AND ACRONYMS
  - A. ANSI American National Standards Institute.
  - B. HMMA Hollow Metal Manufacturers Association.
  - C. NAAMM National Association of Architectural Metal Manufacturers.
  - D. NFPA National Fire Protection Association.
  - E. SDI Steel Door Institute.
  - F. UL Underwriters Laboratories.

#### 1.04 REFERENCE STANDARDS

- A. ADA Standards Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- E. ASTM A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
- F. ASTM A1011/A1011M Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2015.
- G. BHMA A156.115 American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- H. ICC A117.1 Accessible and Usable Buildings and Facilities; 2009.
- I. ITS (DIR) Directory of Listed Products; current edition.
- J. NAAMM HMMA 830 Hardware Selection for Hollow Metal Doors and Frames; 2002.
- K. NAAMM HMMA 831 Hardware Locations for Hollow Metal Doors and Frames; 2011.

- L. NAAMM HMMA 840 Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- M. NAAMM HMMA 861 Guide Specifications for Commercial Hollow Metal Doors and Frames; 2006.
- N. NFPA 80 Standard for Fire Doors and Other Opening Protectives; 2016.
- O. NFPA 252 Standard Methods of Fire Tests of Door Assemblies; 2012.
- P. SDI 117 Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.
- Q. UL (DIR) Online Certifications Directory; current listings at database.ul.com.
- R. UL 10C Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- 1.05 SUBMITTALS
  - A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
  - B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
  - C. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
  - D. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

## 1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
  - 1. Provide hollow metal frames from SDI Certified manufacturer.
- B. Maintain at project site copies of reference standards relating to installation of products specified.
- 1.07 DELIVERY, STORAGE, AND HANDLING
  - A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
  - B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

## PART 2 PRODUCTS

## 2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
  - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
  - 2. De La Fontaine Inc: www.delafontaine.com.
  - 3. Republic Doors: www.republicdoor.com.
  - 4. Steelcraft, an Allegion brand: www.allegion.com/sle.
  - 5. Technical Glass Products: www.tgpamerica.com.
- 2.02 DESIGN CRITERIA
  - A. Requirements for Hollow Metal Doors and Frames:
    - 1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled

(HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.

- 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
- B. Materials
  - 1. Doors and frames to be constructed from formed sheet steel or structural shapes and bars.
    - a. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
    - b. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
    - c. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
  - 2. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door.
  - 3. Door Edge Profile: Hinged edge square, and lock edge beveled.
  - 4. Typical Door Face Sheets: Flush. Refer to Door Schedule for additional information.
  - 5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
  - 6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
    - a. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
    - b. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets
  - 7. Zinc Coating for Typical Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
- C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

## 2.03 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

## 2.04 HOLLOW METAL DOORS

- A. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
- B. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for

fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

- C. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
- D. Electrical Raceways: Provide hollow metal doors to receive electrified hardware with concealed wiring harness and standardized Molex<sup>™</sup> plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware". Wire nut connections are not acceptable.
- E. Door Finish: Factory primed and field finished.
- F. Exterior Doors: Thermally insulated.
  - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 3 Extra Heavy-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 2 Seamless.
    - d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
    - e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
  - 2. Core Material: Polyurethane, 1.8 lbs/cu ft minimum density.
  - 3. Door Thickness: 1-3/4 inch, nominal.
  - 4. Top and Bottom Closures: Flush with top of faces and edges.
  - 5. Provide weep-hole openings in bottom of exterior doors to permit moisture to escape.
- G. Interior Doors, Non-Fire Rated:
  - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 3 Extra Heavy-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 2 Seamless.
    - d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
    - e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M, at wet locations.
  - 2. Door Thickness: 1-3/4 inch, nominal.
  - 3. Top and Bottom Closures: Flush with top of faces and edges.
- H. Fire-Rated Doors:
  - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 3 Extra Heavy-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 2 Seamless.
    - d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
  - 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
  - 3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
    - a. Attach fire rating label to each fire rated unit.
  - 4. Door Thickness: 1-3/4 inch, nominal.
  - 5. Top and Bottom Closures: Flush with top of faces and edges.

#### 2.05 HOLLOW METAL FRAMES

- A. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
- B. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
  - 1. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
- C. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- D. Frame Finish: Factory primed and field finished.
- E. Exterior Door Frames: Full profile/continuously welded type.
  - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
  - 2. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.
  - 3. Weatherstripping: Separate, see Section 08 7100.
- F. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
  1. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
- G. Door Frames, Fire-Rated: Full profile/continuously welded type.
  - 1. Fire Rating: Same as door, labeled.
  - 2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
- H. Mullions for Pairs of Doors: Removable type, with profile similar to jambs.
- I. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.
  - 1. Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame.
  - 2. Fasten members at crossings and to jambs by butt welding.
- J. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
- K. Frames in Masonry Walls: Size to suit masonry coursing with head member 2 inch high to fill opening without cutting masonry units.
- L. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
  - 1. Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
- M. Frames Installed Back-to-Back: Reinforce with steel channels anchored to floor and overhead structure.
- N. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
- O. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
- P. Electrical Thru-Wiring: Provide hollow metal frames receiving electrified hardware with loose wiring harness (not attached to open throat components or installed in closed mullion tubes)

and standardized Molex<sup>™</sup> plug connectors on one end to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electric through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".

- Q. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; including but not limited to, electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".
  - 1. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
  - 2. Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.
  - 3. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section "Door Hardware".
  - 4. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.
- R. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
- S. Jamb Anchors: Provide number and spacing of anchors as follows:
  - 1. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
    - a. Two anchors per jamb up to 60 inches high.
    - b. Three anchors per jamb from 60 to 90 inches high.
    - c. Four anchors per jamb from 90 to 120 inches high.
    - d. Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
  - 2. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
    - a. Three anchors per jamb up to 60 inches high.
    - b. Four anchors per jamb from 60 to 90 inches high.
    - c. Five anchors per jamb from 90 to 96 inches high.
    - d. Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
    - e. Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
- T. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
- U. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.

#### 2.06 FINISHES

A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

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

#### 2.07 ACCESSORIES

- A. Glazing: As specified in Section 08 8000.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, butted corners; prepared for countersink style tamper proof screws.
- C. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.
- D. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
- E. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

## PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

#### 3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.
- B. 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.
- C. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- D. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- E. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

#### 3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Install door hardware as specified in Section 08 7100.
- F. Comply with glazing installation requirements of Section 08 8000.
- G. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
  - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set

and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.

- 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
- 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
- 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- H. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
- I. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.
- 3.04 TOLERANCES
  - A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861
    - 1. Non-Fire-Rated Standard Steel Doors:
      - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
      - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
      - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
      - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
    - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
  - B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

#### 3.05 ADJUSTING AND CLEANING

- A. Remove grout and other bonding material from hollow metal work immediately after installation.
- B. Adjust for smooth and balanced door movement.
- C. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.
- D. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable

#### 3.06 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

## **END OF SECTION**

## SECTION 08 1613 FRP FLUSH DOORS

#### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Fiberglass reinforced polyester (FRP) flush doors in aluminum storefront frames.
- 1.02 RELATED SECTIONS
  - A. Section 087100 Door Hardware.
  - B. Section 084100 Metal Framed Storefronts

#### 1.03 REFERENCES

- A. AAMA 1503-98 Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- B. ANSI A250.4 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
- C. ASTM B 117 Operating Salt Spray (Fog) Apparatus.
- D. ASTM B 209 Aluminum and Aluminum-Alloy Sheet and Plate.
- E. ASTM B 221 Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- F. ASTM D 256 Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.
- G. ASTM D 543 Evaluating the Resistance of Plastics to Chemical Reagents.
- H. ASTM D 570 Water Absorption of Plastics.
- I. ASTM D 638 Tensile Properties of Plastics.
- J. ASTM D 790 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- K. ASTM D 1621 Compressive Properties of Rigid Cellular Plastics.
- L. ASTM D 1623 Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
- M. ASTM D 2126 Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- N. ASTM D 2583 Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
- O. ASTM D 5420 Impact Resistance of Flat Rigid Plastic Specimens by Means of a Falling Weight.
- P. ASTM D 6670-01 Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products.
- Q. ASTM E 84 Surface Burning Characteristics of Building Materials.
- R. ASTM E 90 Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- S. ASTM E 283 Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- T. ASTM E 330 Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- U. ASTM E 331 Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

- V. ASTM F 476 Security of Swinging Door Assemblies.
- W. SFBC PA 201 Impact Test Procedures.
- X. SFBC PA 203 Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
- Y. SFBC 3603.2 (b)(5) Forced Entry Resistance Test.

#### 1.04 PERFORMANCE REQUIREMENTS

- A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.
- B. Air Infiltration: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.24 psf. Door shall not exceed 0.90 cfm per linear foot of perimeter crack.
- C. Water Resistance: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.
- D. Indoor air quality testing per ASTM D 6670-01: GREENGUARD Environmental Institute Certified including GREENGUARD for Children and Schools Certification.
- E. Hurricane Test Standards, Single Door with Single-Point Latching:
  - 1. Uniform Static Load, ASTM E 330: Plus or minus 75 pounds per square foot.
  - 2. Forced Entry Test, 300 Pound Load Applied, SFBC 3603.2 (b)(5): Passed.
  - 3. Cyclic Load Test, SFBC PA 203: Plus or minus 53 pounds per square foot.
  - 4. Large Missile Impact Test, SFBC PA 201: Passed.
- F. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles.
- G. Cycle Slam Test Method, NWWDA T.M. 7-90: Minimum 5,000,000 Cycles.
- H. Swinging Security Door Assembly, Doors and Frames, ASTM F 476: Grade 40.
- I. Salt Spray, Exterior Doors and Frames, ASTM B 117: Minimum of 500 hours.
- J. Sound Transmission, Exterior Doors, STC, ASTM E 90: Minimum of 25.
- K. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503-98: Maximum of 0.29 BTU/hr x sf x degrees F. Minimum of 55 CRF value.
- L. Surface Burning Characteristics, Class A Option On Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
  - 1. Flame Spread: Maximum of 25.
  - 2. Smoke Developed: Maximum of 450.
- M. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 15.0 foot-pounds per inch of notch.
- N. Tensile Strength, FRP Doors and Panels, Nominal Value, ASTM D 638: 14,000 psi.
- O. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.
- P. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.
- Q. Indentation Hardness, FRP Doors and Panels, Nominal Value, ASTM D 2583: 55.
- R. Gardner Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 5420: 120 in-lb.
- S. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.

- T. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to crayon and crankcase oil.
- U. Chemical Resistance, ASTM D 543. Excellent rating.
  - 1. Acetic acid, Concentrated.
  - 2. Ammonium Hydroxide, Concentrated.
  - 3. Citric Acid, 10%.
  - 4. Formaldehyde.
  - 5. Hydrochloric Acid, 10%
  - 6. Sodium hypochlorite, 4 to 6 percent solution.
- V. Compressive Strength, Foam Core, Nominal Value, ASTM D 1621: 79.9 psi.
- W. Compressive Modulus, Foam Core, Nominal Value, ASTM D 1621: 370 psi.
- X. Tensile Adhesion, Foam Core, Nominal Value, ASTM D 1623: 45.3 psi.
- Y. Thermal and Humid Aging, Foam Core, Nominal Value, 158 Degrees F and 100 Percent Humidity for 14 Days, ASTM D 2126: Minus 5.14 percent volume change.

### 1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.
- B. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, hardware schedule, and finish.
- C. Samples:
  - 1. Door: Submit manufacturer's sample of door showing face sheets, core, framing, and finish.
  - 2. Color: Submit manufacturer's samples of standard colors of doors and frames.
- D. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.
- E. Manufacturer's Project References: Submit list of successfully completed projects including project name and location, name of architect, and type and quantity of doors manufactured.
- F. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.
- G. Warranty: Submit manufacturer's warranty.

#### 1.06 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
  - 1. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 5 years successful experience.

## 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer.
- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials and finish from damage during handling and installation.

#### 1.08 WARRANTY

- A. Warrant doors, frames, and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.
- B. Warranty Period: Ten years starting on date of shipment. In addition, a limited lifetime (while the door is in its specified application in its original installation) warranty covering: failure of corner joinery, core deterioration, delamination or bubbling of door skin.

#### **PART 2- PRODUCTS**

#### 2.01 MANUFACTURER

- A. Basis of specification: Model SL-17 Flush FRP Doors by Special-Lite, Inc., PO Box 6, Decatur, Michigan 49045. Toll Free (800) 821-6531. Phone (269) 423-7068. Fax (800) 423-7610. Web Site www.special-lite.com. E-Mail info@special-lite.com.
- B. Substitutions: See Section 01600 Product Requirements
- C. The following manufacturers/products are also approved:
  - 1. Ceco Door Model FRP
  - 2. Vale Doors Model V-250
  - 3. Commercial Door Systems Model F200

#### 2.02 FRP FLUSH DOORS

- A. Model: Flush Doors with fiberglass reinforced polyester (FRP) face sheets.
- B. Door Opening Size: As indicated on the Drawings.
- C. Construction:
  - 1. Door Thickness: 1-3/4 inches.
  - 2. Stiles and Rails: Aluminum Alloy 6063-T5, minimum of 2-5/16-inch depth.
  - 3. Corners: Mitered.
  - 4. Provide joinery of 3/8-inch diameter full-width tie rods through extruded splines top and bottom integral to standard tubular shaped stiles and rails reinforced to accept hardware as specified.
  - 5. Securing Internal Door Extrusions: 3/16-inch angle blocks and locking hex nuts for joinery.
  - 6. Furnish extruded stiles and rails with integral reglets to accept face sheets. Lock face sheets into place to permit flush appearance.
  - 7. Extrude top and bottom rail legs for interlocking continuous weather bar.
  - 8. Meeting Stiles: Pile brush weatherseals. Extrude meeting stile to include integral pocket to accept pile brush weatherseals.
  - 9. Bottom of Door: Install bottom weather bar with nylon brush weatherstripping into extruded interlocking edge of bottom rail.
- D. Face Sheet:
  - 1. Material: FRP, 0.120-inch thickness, finish color throughout.
  - 2. Protective coating: Abuse-resistant engineered surface. Provide FRP with protective coating, or equal.
  - 3. Texture: Pebble.
- E. Color: To be selected from manufacturer's standard range.
- F. Core:
  - 1. Material: Poured-in-place polyurethane foam.

- 2. Density: Minimum of 5 pounds per cubic foot.
- 3. R-Value: Minimum of 9.
- G. Cutouts:
  - 1. Manufacture doors with cutouts for required vision lites, louvers, and panels.
  - 2. Factory install vision lites, louvers, and panels.
- H. Hardware:
  - 1. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.

#### 2.03 MATERIALS

- A. Aluminum Members:
  - 1. Extrusions: ASTM B 221.
  - 2. Sheet and Plate: ASTM B 209.
  - 3. Alloy and Temper: As required by manufacturer for strength, corrosion resistance, application of required finish, and control of color.
- B. Fasteners:
  - 1. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal.
  - 2. Compatibility: Compatible with items to be fastened.
  - 3. Exposed Fasteners: Screws with finish matching items to be fastened.

#### 2.04 FABRICATION

- A. Sizes and Profiles: Required sizes for door and frame units, and profile requirements shall be as indicated on the Drawings.
- B. Coordination of Fabrication: Field measure before fabrication and show recorded measurements on shop drawings.
- C. Assembly:
  - 1. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
  - 2. Remove burrs from cut edges.
- D. Fit:
  - 1. Maintain continuity of line and accurate relation of planes and angles.
  - 2. Secure attachments and support at mechanical joints with hairline fit at contacting members.

#### 2.05 ALUMINUM DOOR FRAMING SYSTEMS

- A. Storefront Framing: See Section 084313: Aluminum-Framed Entrances and Storefronts.
- 2.06 HARDWARE
  - A. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
- 2.07 VISION LITES
  - A. Factory Glazing: 1-inch glass tempered insulating units. See Section 088000.
  - B. Lites in Exterior Doors: Allow for thermal expansion.
  - C. Rectangular Lites:
    - 1. Size: As indicated on the Drawings.
    - 2. Factory glazed with screw-applied aluminum stops with paint finish to match perimeter door rails.

#### 2.08 ALUMINUM FINISHES

A. Painted Finishes: Kynar 500 or Hylar 5000; 2-coat system; color: white.

### PART 3 - EXECUTION

- 3.01 EXAMINATION
  - A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.
- 3.02 PREPARATION
  - A. Ensure openings to receive frames are plumb, level, square, and in tolerance.

#### 3.03 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions.
- B. Install doors plumb, level, square, true to line, and without warp or rack.
- C. Anchor frames securely in place.
- D. Separate aluminum from other metal surfaces with bituminous coatings or other means approved by Architect.
- E. Set thresholds in bed of mastic and backseal.
- F. Install exterior doors to be weathertight in closed position.
- G. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
- H. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.
- 3.04 FIELD QUALITY CONTROL
  - A. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for installation of doors.
- 3.05 ADJUSTING
  - A. Adjust doors, hinges, and locksets for smooth operation without binding.

#### 3.06 CLEANING

- A. Clean doors promptly after installation in accordance with manufacturer's instructions.
- B. Do not use harsh cleaning materials or methods that would damage finish.
- 3.07 PROTECTION
  - A. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

## END OF SECTION
### **SECTION 08 3100**

# ACCESS DOORS AND PANELS

### PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Wall and ceiling access door and frame units.
- 1.02 RELATED REQUIREMENTS
  - A. Section 09 9123 Interior Painting: Field paint finish.
- 1.03 REFERENCE STANDARDS
  - A. UL (FRD) Fire Resistance Directory; current edition.
- 1.04 SUBMITTALS
  - A. See Section 01 3000 Administrative Requirements, for submittal procedures.
  - B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
  - C. Manufacturer's Installation Instructions: Indicate installation requirements.
  - D. Project Record Documents: Record actual locations of each access unit.
- 1.05 QUALITY ASSURANCE
  - A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

### PART 2 PRODUCTS

#### 2.01 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Wall and Ceiling-Mounted Units:
  - 1. Location: As indicated on drawings.
  - 2. Material: Steel.
  - 3. Finish: Primed.
  - 4. Size: 24 inch by 24 inch, unless otherwise noted.
  - 5. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
  - 6. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
  - 7. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.
- B. Wall and Ceiling-Mounted Units in Exterior and Wet Areas:
  - 1. Location: As indicated on drawings.
  - 2. Material: Steel, hot-dipped zinc, or zinc-aluminum-alloy coated.
  - 3. Finish: Primed.
  - 4. Size: 24 inch by 24 inch, unless otherwise noted.
  - 5. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
  - 6. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
  - 7. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.
- 2.02 WALL AND CEILING MOUNTED UNITS
  - A. Manufacturers:

- 1. ACUDOR Products Inc: www.acudor.com/#sle.
- 2. Babcock-Davis: www.babcockdavis.com/#sle.
- 3. Karp Associates, Inc; : www.karpinc.com.
- 4. Milcor, Inc: www.milcorinc.com.
- B. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
  - 1. Style: Exposed frame with door surface flush with frame surface.
    - a. Gypsum Board Mounting Criteria: Use drywall bead type frame.
  - 2. Door Style: Single thickness with rolled or turned in edges.
  - 3. Frames: 16 gage, 0.0598 inch, minimum thickness.
  - 4. Single Steel Sheet Door Panels: 1/16 inch, minimum thickness.
  - 5. Units in Fire-Rated Assemblies: Fire rating as required by applicable code for fire-rated assembly that access doors are being installed.
    - a. Provide products listed by UL (FRD) as suitable for purpose indicated.
    - b. Provide certificate of compliance from authorities having jurisdiction indicating approval of fire rated doors.
  - 6. Hardware:
    - a. Hardware for Fire-Rated Units: As required for listing.
    - b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.

### PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that rough openings are correctly sized and located.
  - B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- 3.02 PREPARATION
  - A. Clean surfaces thoroughly prior to proceeding with this work.
  - B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

### 3.03 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

# END OF SECTION

# **SECTION 08 3313**

# **COILING COUNTER DOORS**

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Non-fire-rated manual coiling counter doors, with operating hardware and integral frame.
- 1.02 RELATED REQUIREMENTS
  - A. Section 08 7100 Door Hardware: Cylinder cores and keys.

### 1.03 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

### 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's standard literature showing materials and details of construction and finish. Include data on electrical operation.
- C. Shop Drawings: Indicate rough and actual opening dimensions, anchorage methods, hardware locations, and installation details.
- D. Manufacturer's Instructions: Indicate installation sequence and installation, adjustment, and alignment procedures.
- E. Operation and Maintenance Data: Indicate modes of operation, lubrication requirements and frequency, and periodic adjustments required.

# PART 2 PRODUCTS

# 2.01 MANUFACTURERS

- A. Coiling Counter Doors:
  - 1. Cornell Iron Works, Inc; Model ESC20: www.cornelliron.com. is the Basis of Design.
  - 2. Substitutions: See Section 01 6000 Product Requirements.

# 2.02 COILING COUNTER DOORS

- A. Coiling Counter Doors, Non-Fire-Rated: Stainless steel slat curtain.
  - 1. Mounting: Interior face mounted.
  - 2. Nominal Slat Size: 1-1/2 inches wide.
  - 3. Slat Profile: Flat.
  - 4. Finish: No. 4 Brushed.
  - 5. Color: As selected by Architect from manufacturer's full range.
  - 6. Guides: Formed track; same material and finish unless otherwise indicated.
  - 7. Hood Enclosure: 16 gauge stainless steel with reinforced top and bottom edges; no, 4 finish.
  - 8. Manual Operation:
    - a. Crank Hoist: Crank hoist operator including crank gear box, steel crank drive shaft and geared reduction unit. Fabricate gear box to completely enclose operating mechanism and be oil-tight.
  - 9. Locking Devices: Masterkeyable cylinder operable from coil side of bottom bar.

### 2.03 MATERIALS

A. Curtain Construction: Interlocking, single thickness slats.

- 1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
- 2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
- 3. Stainless Steel Slats: ASTM A666, Type 304; minimum thickness 22 gage, 0.03 inch.
- B. Guide Construction: Continuous, of profile to retain door in place, with mounting brackets of same metal.
  - 1. Stainless Steel Guides: ASTM A666, Type 304, rollable temper.
- C. Hood Enclosure: Internally reinforced to maintain rigidity and shape.
- D. Lock Hardware:
  - 1. Cylindrical Locking Mechanism: Latchset lock cylinder, specified in Section 08 7100.
- E. Counterbalance Shaft Assembly:
  - 1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width
  - 2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs (110 N). Provide wheel for applying and adjusting spring torque

# PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that opening sizes, tolerances and conditions are acceptable.
- 3.02 INSTALLATION
  - A. Install units in accordance with manufacturer's instructions.
  - B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
  - C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
  - D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

### 3.03 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

### 3.04 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

# END OF SECTION

# SECTION 08 3323 OVERHEAD COILING DOORS

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Overhead coiling doors, operating hardware, exterior, electric operation.
- B. Wiring from electric circuit disconnect to operator to control station.

### 1.02 RELATED REQUIREMENTS

- A. Section 08 3313 Coiling Counter Doors: Coiling Counter Doors
- B. Section 08 7100 Door Hardware: Cylinder cores and keys.
- C. Section 26 0583 Wiring Connections: Power to disconnect.

### 1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. ITS (DIR) Directory of Listed Products; current edition.
- E. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- F. NEMA ICS 2 Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000 (R2005), with errata, 2008.
- G. NEMA MG 1 Motors and Generators; 2014.
- H. UL (DIR) Online Certifications Directory; current listings at database.ul.com.
- I. UL 325 Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

- A. Product Data: Provide, , electrical equipment, and component connections and details.
- B. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- C. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.
- D. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.
- 1.05 QUALITY ASSURANCE
  - A. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

# PART 2 PRODUCTS

- 2.01 MANUFACTURERS
  - A. Overhead Coiling Doors:
    - 1. Cornell Iron Works, Inc; Product ESD20: www.cornelliron.com. is the basis of design.
    - 2. Other Approved manufacturers:

- a. The Cookson Company: www.cooksondoor.com.
- b. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com.
- 3. Substitutions: See Section 01 6000 Product Requirements.

### 2.02 COILING DOORS

- A. Exterior Coiling Doors: Steel slat curtain, insulated.
  - 1. Capable of withstanding positive and negative wind loads of 20 psf, without undue deflection or damage to components.
  - 2. Insulated Door Slat Material Requirements:
    - a. Flame Spread Index of 0 and a Smoke Developed Index of 10 as tested per ASTM E84.
    - b. Minimum Sound Transmission Class (STC) rating of 26 as tested per ASTM E90.
    - c. Minimum R-value of 8.0 (U-factor of 0.125) as calculated using the ASHRAE Handbook of Fundamentals.
    - d. Insulation to be CFC Free with an Ozone Depletion Potential (ODP) rating of zero.
  - 3. Nominal Slat Size: 2 inches wide x required length.
  - 4. Exterior Slat Finish: ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation of a chemical bonding, baked-on polyester base coat and a baked-on polyester finish coat.
  - 5. Interior slat finish: Coating System and phosphate treatment followed by baked-on polyester powder coat, color as selected by Architect from manufacturer's standard color range, minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better.
  - 6. Guides: Angles; galvanized steel.
  - 7. Hood Enclosure: Manufacturer's standard; primed steel.
  - 8. Electric operation.
  - 9. Mounting: Surface mounted.
- 2.03 MATERIALS
  - A. Curtain Construction: Interlocking slats.
    - 1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
    - 2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
    - 3. Weatherstripping (exterior doors): Moisture and rot proof, resilient type.
      - a. Bottom Bar, Motor Operated Doors: Sensing/weather edge with neoprene astragal extending full width of door bottom bar.
      - b. Guides: Replaceable vinyl strip on guides sealing against fascia side of curtain.
      - c. Lintel Seal: Nylon brush seal fitted at door header to impede air flow.
      - d. Hood: Neoprene/rayon baffle to impede air flow above coil.
  - B. Steel Slats: Minimum 20 gage (0.8 mm thick)ASTM A 653/A 653M galvanized steel sheet.
    - 1. Galvanizing: Minimum G90/Z275 coating.
  - C. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
  - D. Steel Guides: Formed from galvanized steel sheet, 3/16 inch thick; complying with ASTM A 653/A 653M.
    - 1. Galvanizing: Minimum G90/Z275 coating.
  - E. Hood Enclosure: Internally reinforced to maintain rigidity and shape.

- 1. Minimum thickness; 24 gage, 0.0239 inch.
- 2. ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation for chemical bonding, baked-on base coat and baked-on polyester finish coat.
- F. Lock Hardware:
  - 1. Cylindrical Locking Mechanism: Latchset lock cylinder, specified in Section 08 7100.
  - 2. For motor operated units, additional lock or latching mechanisms are not required.
- G. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

### 2.04 ELECTRIC OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
  - 1. Provide interlock switches on motor operated units.
- B. Electric Operators:
  - 1. Mounting: Side mounted.
  - 2. Motor Rating: 1/2 hp; continuous duty.
  - 3. Motor Voltage: 480 volt, three phase, 60 Hz.
  - 4. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
  - 5. Controller Enclosure: NEMA 250, Type 1.
  - 6. Opening Speed: 12 inches per second.
  - 7. Brake: Adjustable friction clutch type, activated by motor controller.
  - 8. Manual override in case of power failure.
- C. Control Station: Standard three button (OPEN-STOP-CLOSE) momentary control for each operator.
  - 1. 24 volt circuit.
  - 2. Recessed.
- D. Safety Edge: Located at bottom of curtain, full width, electro-mechanical sensitized type, wired to stop operator upon striking object, hollow neoprene covered.

# PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that opening sizes, tolerances and conditions are acceptable.
- 3.02 INSTALLATION
  - A. Install units in accordance with manufacturer's instructions.
  - B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
  - C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
  - D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
  - E. Coordinate installation of electrical service with Section 26 0583.
  - F. Complete wiring from disconnect to unit components.
  - G. Install perimeter trim and closures.

### 3.03 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch.
- C. Maximum Variation From Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

### 3.04 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

## 3.05 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

### **END OF SECTION**

# SECTION 08 3613 SECTIONAL DOORS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Overhead sectional doors, electrically operated.
- B. Operating hardware and supports.
- C. Electrical controls.

### **1.02 RELATED REQUIREMENTS**

- A. Section 06 1000 Rough Carpentry: Rough wood framing for door opening.
- B. Section 08 7100 Door Hardware: Lock cylinders.

### 1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. ASTM E330/E330M Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- C. DASMA 102 American National Standard Specifications for Sectional Overhead Type Doors; 2011.
- D. NEMA MG 1 Motors and Generators; 2014.
- E. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 325 Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Operation Data: Include normal operation, troubleshooting, and adjusting.
- E. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
- C. Conform to applicable code for motor and motor control requirements.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified.

- 1.06 WARRANTY
  - A. See Section 01 7800 Closeout Submittals for warranty requirements.
  - B. Correct defective Work within a five year period after Date of Substantial Completion.
  - C. Warranty: Include coverage for electric motor.

# PART 2 PRODUCTS

- 2.01 MANUFACTURERS
  - A. Sectional Doors Basis of Design::
    - 1. C.H.I. Overhead Doors; Model 3212 Micro-Grooved Sandwich Steel Insulated Doors: www.chiohd.com/sle.
  - B. Other Acceptable Manufacturers:
    - 1. C.H.I. Overhead Doors; Model 3212 Micro-Grooved Sandwich Steel Insulated Doors: www.chiohd.com/sle.
    - 2. Wayne-Dalton, a Division of Overhead Door Corporation; \_\_\_\_: www.wayne-dalton.com.
    - 3. Raynor Garage Doors: www.raynor.com/.
    - 4. Substitutions: See Section 01 6000 Product Requirements.

# 2.02 STEEL DOOR COMPONENTS

- A. Steel Doors: Flush steel, insulated; high lift operating style with track and hardware; complying with DASMA 102, Commercial application.
  - 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
  - 2. Door Nominal Thickness: 2 inches thick.
  - 3. Thermal Resistance: R-value of 3.22, minimum, for overall thickness indicated.
  - 4. Exterior Finish: Factory finished with polyester baked enamel; color as selected by Architect.
  - 5. Interior Finish: Factory finished with polyester baked enamel; color as selected from manufacturers standard line.
  - 6. Operation: Electric.
- B. Door Panels: Steel construction; outer steel sheet of 20 gage, 0.0359 inch minimum thickness, flush profile; inner steel sheet of 27 gage, 0.0164 inch minimum thickness, flat profile; core reinforcement sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; polyurethane insulation.

### 2.03 DOOR COMPONENTS

- A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 3 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.
- B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.
- C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
- D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.

- E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- F. Head Weatherstripping: EPDM rubber seal, one piece full length.
- G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- H. Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior handle.
- I. Lock Cylinders: See Section 08 7100.

#### 2.04 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Insulation: Foamed-in-place polyurethane, bonded to facing.

#### 2.05 ELECTRICAL OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by a testing agency acceptable to authorities having jurisdiction.
- B. Electrical Characteristics:
  - 1. 1 hp; manually operable in case of power failure, transit speed of 12 inches per second.
  - 2. 208 volts, three phase, 60 Hz.
- C. Motor: NEMA MG 1, Type 1.
- D. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
- E. Disconnect Switch: Factory mount disconnect switch in control panel.
- F. Electric Operator: Side mounted on cross head shaft, adjustable safety friction clutch; brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter; mounting brackets and hardware.
- G. Safety Edge: At bottom of door panel, full width; electro-mechanical sensitized type, wired to stop door upon striking object; hollow neoprene covered to provide weatherstrip seal.
- H. Control Station: Standard three button (open-close-stop) momentary type control for each electric operator.
  - 1. 24 volt circuit.
  - 2. Surface mounted.
  - 3. Locate at inside door jamb.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

### 3.02 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

- D. Fit and align door assembly including hardware.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- F. Install perimeter trim.
- 3.03 ADJUSTING
  - A. Adjust door assembly for smooth operation and full contact with weatherstripping.

### 3.04 CLEANING

- A. Clean doors and frames.
- B. Remove temporary labels and visible markings.

# END OF SECTION

# **SECTION 08 4313**

### ALUMINUM-FRAMED STOREFRONTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Infill panels of vision glass.
- C. Aluminum frames for FRP doors.
- D. Weatherstripping.

### 1.02 RELATED REQUIREMENTS

- A. Section 07 9200 Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 08 1613 FRP Flush Doors: FRP Doors in aluminum storefront frames.
- C. Section 08 7100 Door Hardware: Hardware items other than specified in this section.
- D. Section 08 8000 Glazing: Glass and glazing accessories.

### 1.03 REFERENCE STANDARDS

- A. AAMA CW-10 Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- B. AAMA 609 & 610 Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- C. AAMA 1503 Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- D. AAMA 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
- E. ASCE 7 Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- F. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- G. ASTM B221M Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- H. ASTM E283 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- I. ASTM E330/E330M Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- J. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

### 1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

### 1.05 SUBMITTALS

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

- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit two samples 12 by 12 inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.
- E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- 1.06 QUALITY ASSURANCE
  - A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
  - B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
- 1.07 DELIVERY, STORAGE, AND HANDLING
  - A. Handle products of this section in accordance with AAMA CW-10.
  - B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

### 1.08 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

### 1.09 WARRANTY

- A. Correct defective Work within a two year period after Date of Substantial Completion.
- B. Provide ten year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- C. Provide twenty year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

# PART 2 PRODUCTS

# 2.01 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

- A. Locations: All storefront locations in exterior building envelope and where 1" insulating glass is scheduled.
- B. Manufacturer and Product: Kawneer Trifab 451UT Storefront System: www.kawneer.com.
- C. Storefront Framing System:
  - 1. Description: Center set, exterior flush glazed; jambs and vertical mullions continuous; head, sill, intermediate horizontal attached by screw spline joinery.
  - 2. Components: Manufacturer's standard extruded aluminum mullions, 90 degree corner posts, entrance door framing, and indicated shapes.
  - 3. Dual Thermal Barrier: Provide dual continuous thermal barriers by means of poured and debridged pockets consisting of a two-part, chemically curing high density polyurethane which is bonded to the aluminum.
  - 4. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.

- D. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of another manufacturer with approved submittal meeting the design criteria..
  - 1. YKK AP America Inc: www.ykkap.com.
  - 2. Oldcastle Building Envelope: www.obe.com.
- E. Substitutions: See Section 01 6000 Product Requirements.
  - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

## 2.02 STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
  - 1. Finish: Superior performing organic coatings.
    - a. Factory finish all surfaces that will be exposed in completed assemblies.
    - b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
    - c. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
  - 2. Finish Color: As selected by Architect from manufacturer's standard line.
  - 3. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
  - 4. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
  - 5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
  - 6. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
  - 7. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
  - 8. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
  - 9. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
- B. Performance Requirements for Thermally-Broken Storefront System:
  - 1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
    - a. Design Wind Loads: Comply with requirements of ASCE 7.
    - b. See structural drawings for lateral load design factors.
    - c. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
  - 2. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 10 psf. Fastener Heads must be

seated and sealed against sill flashing or any fasteners that penetrate through the sill flashing.

- 3. Air Leakage: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.
- 4. Condensation Resistance Factor of Framing: 66, minimum, measured in accordance with AAMA 1503.
- 5. Overall U-value Including Low-E Glazing: 0.36 Btu/(hr sq ft deg F), maximum.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
  - 1. Framing members for interior applications need not be thermally broken.
  - 2. Glazing Stops: Flush.
- B. Glazing: As specified in Section 08 8000.
- C. Infill Panels: Insulated, aluminum sheet face and back, with edges formed to fit glazing channel and sealed.
  - 1. Substrate: high density tempered hardboard and impact resistant layer
  - 2. Core: Rigid polyisocyanurate insulation.
  - 3. Interior and Exterior Finish: Superior performance organic coating, custom color to match Architect's sample.
  - 4. Manufacturers: Mapes Industries, Inc.
- 2.04 MATERIALS
  - A. Extruded Aluminum: ASTM B221 (ASTM B221M).
  - B. Fasteners: Stainless steel.
  - C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- 2.05 FINISHES
  - A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride (PVDF) system.
    - 1. Polyvinylidene fluoride (PVDF) multi-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness of 0.9 mil; color and gloss as selected from manufacturer's standard line.
- 2.06 HARDWARE
  - A. Other Door Hardware: As specified in Section 08 7100.
  - B. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.

# PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify dimensions, tolerances, and method of attachment with other work.
  - B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.
- 3.02 INSTALLATION
  - A. Install wall system in accordance with manufacturer's instructions.
  - B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Extend extruded flashing continuous with splice joints; set in continuous bed of sealant. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Locate expansion mullions where indicated on reviewed shop drawings.
- I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- J. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

### 3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

### 3.04 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

### 3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

# 3.06 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

# END OF SECTION

# SECTION 08 5655 TICKET WINDOWS

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Includes:
  - 1. Fixed, transaction ticket windows.
- 1.02 COORDINATION
  - A. Coordinate installation of anchorages for ticket windows. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in adjacent construction. Deliver such items to Project site in time for installation.

### 1.03 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

### 1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for window units.
- B. Shop Drawings: For ticket windows.
  - 1. Include plans, elevations, sections, and attachments to other work.
  - 2. Full-size section details of framing members.
  - 3. Glazing details.
  - 4. Details of deal tray, transaction counter, and speaking aperture.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
  - 1. Framing: 12-inch- long sections of frame members.
- 1.05 INFORMATIONAL SUBMITTALS
  - A. Sample Warranty: For special warranty.
- 1.06 DELIVERY, STORAGE, AND HANDLING
  - A. Pack ticket windows in wood crates for shipment. Crate glazing separate from frames unless factory glazed.
  - B. Label ticket window packaging with drawing designation.
  - C. Store crated ticket windows on raised blocks to prevent moisture damage.
- 1.07 FIELD CONDITIONS
  - A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.
- 1.08 WARRANTY
  - A. Special Warranty: Manufacturer agrees to repair or replace ticket windows that fail in materials or workmanship within specified warranty period.
    - 1. Warranty Period: Three (3) years from date of Substantial Completion.

# PART 2 - PRODUCTS

- 2.01 FIXED, TRANSACTION TICKET WINDOWS
  - A. Provide fixed, framed transaction windows with operable sash or ventilator capable of allowing transfer of currency and documents.
    - 1. Basis-of-Design Product: Subject to compliance with requirements, provide aluminum ticket window, catalog number SCW102N, manufactured by C. R. Laurence, Co. Inc.; or comparable product by one of the following:
      - a. Creative Industries, Inc.
      - b. Quikserv Corp.
  - B. Configuration: One fixed-glazed panel.
  - C. Framing: Fabricate perimeter framing, mullions, and glazing stops from aluminum as follows:
    - 1. Profile: Manufacturer's standard, with minimum face dimension indicated. a. Minimum Face Dimension: 0.625 inches.
    - 2. Depth: Minimum Dimension: 1.390 inches.
  - D. Transaction Counter: 16 gauge, stainless steel, 18 inches deep by width of ticket window, centered in opening.
  - E. Glazing: 0.25" tempered glass.
  - F. Materials:
    - 1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.
    - 2. Aluminum Extrusions: ASTM B 221. Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength.
    - 3. Aluminum Sheet and Plate: ASTM B 209.
- 2.02 FABRICATION
  - A. General: Fabricate ticket windows to provide a complete system for assembly of components and anchorage of window units.
    - 1. Prepare ticket windows for glazing unless preglazing at the factory is indicated.
  - B. Provide weep holes and internal water passages for exterior ticket windows to conduct infiltrating water to the exterior.
  - C. Framing: Pprovide snap-in cover for fastening channel..
  - D. Glazing Stops: Stops integral with frame extrusion.
  - E. Metal Protection: Separate dissimilar metals to protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
  - F. Factory-cut openings in glazing for speaking apertures.

### 2.03 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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

# 2.04 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

# 2.05 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
  1. Run grain of directional finishes with long dimension of each piece.
  - 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
  - 3. Directional Satin Finish: No. 4.

# 2.06 ACCESSORIES

- A. Transaction Door: Half-round pivoting door, formed from stainless steel with exposed flanges for installation into sill framing.
- B. Speaking Apertures: No-draft stainless steel speaking louver.
  - 1. Shape: Circular.
  - 2. Product: Model 834A manufactured by C. R. Laurence, Co. Inc
- C. Compression-Type Glazing Strips and Weather Stripping: Unless otherwise indicated, provide compressible stripping for glazing and weather stripping, such as molded EPDM or neoprene gaskets complying with ASTM D 2000, Designations 2BC415 to 3BC620; molded PVC gaskets complying with ASTM D 2287; or molded, expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.
- D. Miscellaneous Glazing Materials: Provide material, size, and shape complying with requirements of glass manufacturers and with a proven record of compatibility with surfaces contacted in installation.
  - 1. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
  - 2. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
  - 3. Spacers: Elastomeric blocks or continuous extrusions with a Type A Shore durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
  - 4. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- E. Anchors, Clips, and Window Accessories: Stainless steel; hot-dip, zinc-coated steel or iron, complying with ASTM B 633.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- G. Sealants: For sealants required within fabricated ticket windows, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating.

# PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of ticket windows.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations of ticket window connections before ticket window installation.
- C. Inspect built-in and cast-in anchor installations, before installing ticket windows, to verify that anchor installations comply with requirements. Prepare inspection reports.
  - 1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.
  - 2. Perform additional inspections to determine compliance of replaced or additional work. Prepare anchor inspection reports.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing ticket windows to in-place construction. Include threaded fasteners for inserts, security fasteners, and other connectors.
- B. Fasteners: Install ticket windows using fasteners recommended by manufacturer with head style appropriate for installation requirements, strength, and finish of adjacent materials. Provide stainless-steel fasteners in stainless-steel materials.
- C. Sealants: Comply with requirements in Section 07 9005 "Joint Sealers" for installing sealants, fillers, and gaskets.
  - 1. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction unless otherwise indicated.
  - 2. Seal frame perimeter with sealant to provide weathertight construction unless otherwise indicated.
- D. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended in writing by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- 3.03 ADJUSTING
  - A. Remove and replace defective work, including ticket windows that are warped, bowed, or otherwise unacceptable.

### 3.04 CLEANING AND PROTECTION

- A. Clean surfaces promptly after installation of ticket windows. Take care to avoid damaging the finish. Remove excess glazing and sealant compounds, dirt, and other substances.
- B. Clean glass of preglazed ticket windows promptly after installation.
- C. Provide temporary protection to ensure that ticket windows are without damage at time of Substantial Completion.

# **END OF SECTION**

# SECTION 08 7100 DOOR HARDWARE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
  - 2. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Electromechanical door hardware.
  - 3. Cylinders specified for doors in other sections.
- C. Related Sections:
  - 1. Section 08 1113 Hollow Metal Doors and Frames.
  - 2. Section 08 1416 Flush Wood Doors.
  - 3. Section 08 0671 Hardware Sets.
  - 4. Division 26 Electrical.
  - 5. Division 28 Access Control.
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 Accessible and Usable Buildings and Facilities.
  - 2. ICC/IBC International Building Code.
  - 3. NFPA 70 National Electrical Code.
  - 4. NFPA 80 Fire Doors and Windows.
  - 5. NFPA 101 Life Safety Code.
  - 6. NFPA 105 Installation of Smoke Door Assemblies.
  - 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards:
  - 1. ANSI/BHMA Certified Product Standards A156 Series
  - 2. UL10C Positive Pressure Fire Tests of Door Assemblies

### 1.2 SUBMITTALS

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

- 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
- 3. Content: Include the following information:
  - a. Type, style, function, size, label, hand, and finish of each door hardware item.
  - b. Manufacturer of each item.
  - c. Fastenings and other pertinent information.
  - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
  - e. Explanation of abbreviations, symbols, and codes contained in schedule.
  - f. Mounting locations for door hardware.
  - g. Door and frame sizes and materials.
  - h. Warranty information for each product.
- 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
  - 1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
    - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
    - b. Complete (risers, point-to-point) access control system block wiring diagrams.
    - c. Wiring instructions for each electronic component scheduled herein.
  - 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Proof of Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified and authorized provider of the primary Integrated Wiegand Access Control Products.
- E. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- F. Informational Submittals:
  - 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

G. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

## 1.3 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- D. Integrated Wiegand, Wireless, and IP-Enabled Access Control Products Supplier Qualifications: Integrated access control products and accessories are required to be supplied and installed through current members of the ASSA ABLOY "Authorized Channel Partner" (ACP) and "Certified Integrator" (CI) programs. Suppliers are to be factory trained, certified prior to project bid, and a direct purchaser of the specified product. Installers are to be factory trained, certified prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
  - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
  - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
  - 1. Function of building, purpose of each area and degree of security required.
  - 2. Plans for existing and future key system expansion.
  - 3. Requirements for key control storage and software.
  - 4. Installation of permanent keys, cylinder cores and software.
  - 5. Address and requirements for delivery of keys.

- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
  - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
  - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
  - 3. Review sequence of operation narratives for each unique access controlled opening.
  - 4. Review and finalize construction schedule and verify availability of materials.
  - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

# 1.4 DELIVERY, STORAGE, AND HANDLING

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

# 1.5 COORDINATION

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

## 1.6 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of the hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
  - 1. Ten years for mortise locks and latches.
  - 2. Five years for exit hardware.
  - 3. Twenty five years for manual surface door closer bodies.
  - 4. Five years for motorized electric latch retraction exit devices.
  - 5. Two years for electromechanical door hardware.

### 1.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

# PART 2 - PRODUCTS

### 2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
  - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

- 1. Permanent cylinders, cores, and keys to be installed by Owner.
- D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

### 2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.
  - 1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.
    - c. Four Hinges: For doors with heights 91 to 120 inches.
    - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
  - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
    - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
  - 3. Hinge Options: Comply with the following:
    - a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
  - 4. Acceptable Manufacturers:
    - a. Hager Companies (HA).
    - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cutouts.
  - 1. Acceptable Manufacturers:
    - a. Hager Companies (HA).
    - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
    - c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

### 2.3 POWER TRANSFER DEVICES

- A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex<sup>™</sup> standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
  - 1. Acceptable Manufacturers:
    - a. Hager Companies (HA) ETW-QC (# wires) Option.

- b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) QC (# wires) Option.
- B. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex<sup>™</sup> standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
  - 1. Acceptable Manufacturers:
    - a. Securitron (SU) EL-CEPT Series.
- C. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to throughdoor wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.
  - 1. Provide one each of the following tools as part of the base bid contract:
    - a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) Electrical Connecting Kit: QC-R001.
    - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) Connector Hand Tool: QC-R003.
  - 2. Acceptable Manufacturers:
    - a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) QC-C Series.

### 2.4 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
  - 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
  - 2. Furnish dust proof strikes for bottom bolts.
  - 3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
  - 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
  - 5. Acceptable Manufacturers:
    - a. Door Controls International (DC).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    - c. Trimco (TC).
- B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, holdopen lever and inactive-leaf release trigger. Model as indicated in hardware sets.
  - 1. Acceptable Manufacturers:
    - a. Door Controls International (DC).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    - c. Trimco (TC).

- C. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
  - 1. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
  - 2. Acceptable Manufacturers:
    - a. Hiawatha, Inc. (HI).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    - c. Trimco (TC).

# 2.5 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
- C. Cylinders: Original manufacturer cylinders complying with the following:
  - 1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
  - 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  - 3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
  - 4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
  - 5. Keyway: Match Facility Standard.
- D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
  - 1. Removable Cores: Core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware. Provide removable core (small or large format) as specified in Hardware Sets.
- E. Security Cylinders: ANSI/BHMA A156.5, Grade 1, patterned security cylinders and keys able to be used together under the same facility master or grandmaster key system. Cylinders are to be factory keyed.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin (RU) Pyramid PS Series.
    - b. No Substitution.
- F. Keying System: Each type of lock and cylinders to be factory keyed.
  - 1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
  - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
  - 3. Existing System: Key locks to Owner's existing system.
- G. Key Quantity: Provide the following minimum number of keys:
  - 1. Change Keys per Cylinder: Two (2)
  - 2. Master Keys (per Master Key Level/Group): Five (5).
  - 3. Construction Keys (where required): Ten (10).

- 4. Construction Control Keys (where required): Two (2).
- H. Construction Keying: Provide temporary keyed construction cores.
- I. Key Registration List (Bitting List):
  - 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
  - 2. Provide transcript list in writing or electronic file as directed by the Owner.
- J. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
  - 1. Acceptable Manufacturers:
    - a. Lund Equipment (LU).
    - b. MMF Industries (MM).
    - c. Telkee (TK).

### 2.6 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) ML2000 Series.
    - b. No Substitution.

### 2.7 INTEGRATED WIEGAND OUTPUT LOCKING DEVICES – MULTI-CLASS READER

- A. Integrated Wiegand Output Multi-Class Mortise Locks: Wiegand output ANSI A156.13, Grade 1, mortise lockset with integrated card reader, request-to-exit signaling, door position status switch, and latchbolt monitoring in one complete unit. Hard wired, solenoid driven locking/unlocking control of the lever handle trim, 3/4" deadlocking anti-friction latch, and 1" case-hardened steel deadbolt. Lock is U.L listed and labeled for use on up to 3 hour fire rated openings. Available with or without keyed high security cylinder override.
  - 1. Open architecture, hard wired platform supports centralized control of locking units with new or existing Wiegand compatible access control systems. Latchbolt monitoring and door position switch act in conjunction to report door-in-frame (DPS) and door latched (door closed and latched) conditions.
  - 2. Integrated reader supports the following credentials:
    - a. 125kHz proximity credentials: HID, AWID, Indala, and EM4102.
      - b. 13.56 MHz proximity credentials: HID iClass, HID iClass SE, SE for MIFARE Classic, DESFire EV1.
  - 3. 12VDC external power supply required for reader and lock, with optional 24VDC lock solenoid. Fail safe or fail secure options.
  - 4. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
  - 5. Support end-of-line resistors contained within the lock case.

- 6. Installation requires only one cable run from the lock to the access control panel without requirements for additional proprietary lock panel interface boards or modules.
- 7. Installation to include manufacturer's access control panel interface board or module where required for Wiegand output protocol.
- 8. Acceptable Manufacturers:
  - a. Corbin Russwin (RU) ML2000 SE-LP10 Series.
  - b. No Substitution.

### 2.8 AUXILIARY LOCKS

- A. Cylindrical Deadlocks: ANSI/BHMA A156.36, Grade 1, cylindrical type deadlocks to fit standard ANSI 161 preparation and 1 3/8" to 1 3/4" thickness doors. Provide tapered collars to resist vandalism and 1" throw solid steel bolt with hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other locksets.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) DL3200 Series.
    - b. No Substitution.

### 2.9 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
  - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
  - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
  - 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
  - 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
  - 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
  - 2. Strikes for Bored Locks and Latches: BHMA A156.2.
  - 3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
  - 4. Dustproof Strikes: BHMA A156.16.

### 2.10 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
  - 1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
  - 2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the

proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.

- 3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
- 4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
- 5. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.
- 6. Motorized Electric Latch Retraction: Devices with an electric latch retraction feature must use motors which have a maximum current draw of 600mA. Solenoid driven latch retraction is not acceptable.
- 7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
  - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
  - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
- 8. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
- 9. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
- 10. Extended cycle test: Devices to have been cycle tested in ordinance with ANSI/BHMA 156.3 requirements to 9 million cycles.
- 11. Rail Sizing: Provide exit device rails factory sized for proper door width application.
- 12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) ED4000 / ED5000 Series.
    - b. Sargent Manufacturing (SA) 80 Series.
- C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish.
  - 1. Provide keyed removable feature where specified in the Hardware Sets.
  - 2. Provide stabilizers and mounting brackets as required.
  - 3. Provide electrical quick connection wiring options as specified in the hardware sets.
  - 4. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) 700/900 Series.
    - b. Sargent Manufacturing (SA) 980S Series.

### 2.11 INTEGRATED WIEGAND OUTPUT EXIT DEVICES – MULTI-CLASS READER

- A. Integrated Wiegand Output Multi-Class Exit Hardware: Wiegand output ANSI 156.3 Grade 1 rim, mortise, and vertical rod exit device hardware with integrated proximity card reader, latchbolt and touchbar monitoring, and request-to-exit signaling, in one complete unit. Hard wired, solenoid driven locking/unlocking control of the lever handle exit trim with 3/4" throw latch bolt. U.L listed and labeled for either panic or "fire exit hardware" for use on up to 3 hour fire rated openings. Available with or without keyed high security cylinder override.
  - 1. Open architecture, hard wired platform supports centralized control of locking units with new or existing Wiegand compatible access control systems. Inside push bar (request-to-exit) signaling and door position (open/closed status) monitoring (via separately connected DPS).
  - 2. Integrated reader supports the following credentials:
    - a. 125kHz proximity credentials: HID, AWID, Indala, and EM4102.
    - b. 13.56 MHz proximity credentials: HID iClass, HID iClass SE, SE for MIFARE Classic, DESFire EV1.
  - 3. 12VDC external power supply required for reader. 24VDC required for solenoid operated exit trim. Fail safe or fail secure options.
  - 4. Installation requires only one cable run from the exit hardware to the access control panel without requirements for additional proprietary lock panel interface boards or modules.
  - 5. Competitor Alternates Allowed Option>Installation to include manufacturer's access control panel interface board or module where required for Wiegand output protocol.
  - 6. Acceptable Manufacturers:
    - a. Corbin Russwin (RU) ED5000 SE-LP10 Series.
    - b. Sargent Manufacturing (SA) M1 80 Series.

# 2.12 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
  - 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
  - 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
  - 3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
  - 4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
  - 5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  - 6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  - 7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) DC6000 Series.
    - b. Sargent Manufacturing (SA) 351 Series.
    - c. Norton Door Controls (NO) 7500 Series.
- C. Door Closers, Surface Mounted (Cam Action): ANSI/BHMA 156.4, Grade 1 certified surface mounted, high efficiency door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be of the cam and roller design, one piece cast aluminum silicon alloy body with adjustable backcheck and independently controlled valves for closing sweep and latch speed.

  Acceptable Manufacturers:
  - Acceptable Manufacturers:
    - a. Corbin Russwin (RU) DC5000 Series.
    - b. Norton Door Controls (NO) 2800ST Series.
    - c. Sargent Manufacturing (SA) 422 Series.

# 2.13 SURFACE MOUNTED CLOSER HOLDERS

- A. Electromagnetic Door Holders: Certified ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate.12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.
  - 1. Acceptable Manufacturers:
    - a. Rixson (RF) 980/990 Series.
    - b. Sargent Manufacturing (SA) 1560 Series.

# 2.14 ARCHITECTURAL TRIM

### A. Door Protective Trim

- 1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
- 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
- 3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
- 4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
  - a. Stainless Steel: 300 grade, 050-inch thick.
- 5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

- 6. Acceptable Manufacturers:
  - a. Hiawatha, Inc. (HI).
  - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
  - c. Trimco (TC).

### 2.15 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
  - 1. Acceptable Manufacturers:
    - a. Hiawatha, Inc. (HI).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    - c. Trimco (TC).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
  - 1. Acceptable Manufacturers:
    - a. Rixson Door Controls (RF).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    - c. Sargent Manufacturing (SA).

### 2.16 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
  - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
  - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Acceptable Manufacturers:
  - 1. National Guard Products (NG).
  - 2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
  - 3. Reese Enterprises, Inc. (RE).

### 2.17 ELECTRONIC ACCESSORIES

- A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
  - 1. Acceptable Manufacturers:
    - a. Securitron (SU) DPS Series.
    - b. Sentrol 1076D.
- B. Wiegand Test Unit: Test unit verifies proper Wiegand output integrated card reader lock installation in the field by testing for proper wiring, card reader data integrity, and lock functionality including lock/unlock, door position, and request-to-exit status. 12 or 24VDC voltage adjustable operating as Fail Safe or Fail Secure.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) WT2 Wiegand Test Unit.
    - b. Sargent Manufacturing (SA) WT2 Wiegand Test Unit.
- C. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
  - 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) BPS Series.
    - b. Sargent Manufacturing (SA) 3500 Series.
    - c. Securitron (SU) BPS Series.

### 2.18 FABRICATION

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

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

## PART 3 - EXECUTION

## 3.1 EXAMINATION

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

### 3.2 PREPARATION

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

### 3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
  - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."

- 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Integrated Wiegand access control products are required to be installed through current members of the ASSA ABLOY "Certified Integrator" (CI) program.
- D. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

## 3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

### 3.5 ADJUSTING

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

### 3.6 CLEANING AND PROTECTION

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

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## 3.7 DEMONSTRATION

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

# SECTION 08 8000 GLAZING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds and accessories.

## 1.02 RELATED REQUIREMENTS

- A. Section 08 1113 Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
- B. Section 08 4313 Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.
- 1.03 REFERENCE STANDARDS
  - A. 16 CFR 1201 Safety Standard for Architectural Glazing Materials; current edition.
  - B. ANSI Z97.1 American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.
  - C. ASTM C864 Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2015).
  - D. ASTM C920 Standard Specification for Elastomeric Joint Sealants; 2014a.
  - E. ASTM C1036 Standard Specification for Flat Glass; 2011.
  - F. ASTM C1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
  - G. ASTM C1193 Standard Guide for Use of Joint Sealants; 2016.
  - H. ASTM C1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.
  - I. ASTM E1300 Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
  - J. ASTM E2190 Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
  - K. GANA (SM) GANA Sealant Manual; 2008.
  - L. IGMA TM-3000 North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (2004).
  - M. NFRC 100 Procedure for Determining Fenestration Product U-factors; 2014.
  - N. NFRC 200 Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014.
  - O. NFRC 300 Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2014.

1.04 SUBMITTALS

A. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- C. Samples: Submit two samples 12 by 12 inch in size of glass units.
- D. Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

### 1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with IGMA TM-3000 for glazing installation methods. Maintain one copy on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

## 1.06 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.
- 1.07 WARRANTY
  - A. See Section 01 7800 Closeout Submittals, for additional warranty requirements.
  - B. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
  - C. Laminated Glass: Provide a ten (10) year manufacturer warranty to include coverage for delamination, including replacement of failed units.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Float Glass Manufacturers:
  - 1. Guardian Industries Corp: www.sunguardglass.com.
  - 2. Pilkington North America Inc: www.pilkington.com/na.
  - 3. PPG Industries, Inc: www.ppgideascapes.com.

## 2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
  - 1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
  - 2. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
  - 3. Glass thicknesses listed are minimum.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
  - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.

- C. Thermal and Optical Performance: Provide glass products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
  - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  - 3. Solar Optical Properties: Comply with NFRC 300 test method.
- 2.03 GLASS MATERIALS
  - A. Float Glass: Provide float glass based glazing unless noted otherwise.
    - 1. Annealed Type: ASTM C1036, Type I Transparent Flat, Class 1 Clear, Quality-Q3.
    - 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and FT.
    - 3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria.
    - 4. Impact Resistant Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria; Class B/Category I.
    - 5. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.
- 2.04 INSULATING GLASS UNITS
  - A. Insulating Glass Units: Types as indicated.
    - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
    - 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
    - Warm-Edge Spacers: Low conductivity thermoplastic and stainless steel.
       a. Spacer Width: As required for specified insulating glass unit.
    - 4. Spacer Color: Dark gray.
    - 5. Edge Seal:
      - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone or polysulfide sealant as secondary seal applied around perimeter.
    - 6. Color: Black.
    - 7. Purge interpane space with dry air, hermetically sealed.
- 2.05 BASIS OF DESIGN INSULATING GLASS UNITS
  - A. Type 1 Vision glazing, with Low-E coating.
    - 1. Applications: Exterior insulating glass glazing unless otherwise indicated.
    - 2. Space between lites filled with argon.
    - 3. Total Thickness: 1 inch.
    - 4. Thermal Transmittance (U-Value): 0.24, nominal.
    - 5. Visible Light Transmittance (VLT): 74 percent, nominal.
    - 6. Solar Heat Gain Coefficient (SHGC): 0.41, nominal.
    - 7. Glazing Method: Dry glazing method, gasket glazing.
    - 8. Basis of Design Guardian Glass, LLC: www.guardianglass.com.
    - 9. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum. a. Low-E Coating: SunGuard SNX 62/27 on #2 surface.
    - Inboard Lite: Annealed float glass, 1/4 inch thick.
      - a. Coating: No coating on inboard lite.

- b. Tint: Clear.
- B. Type 1A -Sealed Insulating Glass Units: Safety glazing:
  - 1. Applications: Provide this type of glazing in the following locations:
    - a. Glazed lites in exterior doors.
    - b. Glazed sidelights and panels next to doors.
    - c. Other locations required by applicable federal, state, and local codes and regulations.
    - d. Other locations indicated on the drawings.
  - 2. Type: Same as Type 1 except use fully tempered float glass for both outboard and inboard lites.
- C. Type 1B -Sealed Insulating Glass Units: Obscure glazing:
  - 1. Applications: Provide this type of glazing in the following locations:
    - a. Exterior windows in toilet, bathing, and shower rooms.
    - b. Other locations indicated on the drawings.
  - Type: Same asType 1 except use patterned obscure glass for inboard lite.
     a. Pattern: No. 62
- D. Type 2 Spandrel glazing.
  - 1. Applications: Exterior spandrel glazing unless otherwise indicated.
  - 2. Space between lites filled with argon.
  - 3. Basis of Design Guardian Glass, LLC: www.guardianglass.com.
  - 4. Outboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum.
    - a. Tint: Clear.
    - b. Coating: Same as on vision units, on #2 surface.
  - 5. Inboard Lite: Fully tempered float glass, 1/4 inch thick.
    - a. Tint: Clear.
    - b. Opacifier: Ceramic frit, on #3 surface.
    - c. Opacifier Color: as selected by Architect from manufacturer's full range.
    - d. Coating: OpaciCoat 300.
  - 6. Total Thickness: 1 inch.
- E. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of another acceptable manufacturer.
- F. Substitution Procedures: See Section 01 6000 Product Requirements.
  - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.
- 2.06 GLAZING UNITS
  - A. Type 3 Monolithic Interior Vision Glazing:
    - 1. Applications: Interior glazing unless otherwise indicated.
    - 2. Glass Type: Fully tempered float glass.
    - 3. Tint: Clear.
    - 4. Thickness: 1/4 inch, nominal.
    - 5. Locations: Interior vision panels, doors and sidelites.

### 2.07 GLAZING COMPOUNDS

A. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

- B. Polysulfide Sealant: Two component; chemical curing, non-sagging type; ASTM C920, Type M, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.
- C. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; clear color.

## 2.08 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
  - 1. Width: As required for application.
  - 2. Thickness: As required for application.
- D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; color black.

## PART 3 EXECUTION

## 3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- C. Verify that sealing between joints of glass framing members has been completed effectively.
- D. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry immediately before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

### 3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.
- 3.04 INSTALLATION DRY GLAZING METHOD (GASKET GLAZING)
  - A. Application Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
  - B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
  - C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
  - D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.
- 3.05 INSTALLATION PRESSURE GLAZED SYSTEMS
  - A. Application Exterior Glazed: Set glazing infills from the exterior of the building.
  - B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
  - C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
  - D. Install pressure plates without displacing glazing gasket; exert pressure for full continuous contact.
  - E. Install cover plate.
- 3.06 FIELD QUALITY CONTROL
  - A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
  - B. Monitor and report installation procedures and unacceptable conditions.
- 3.07 CLEANING
  - A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
  - B. Remove non-permanent labels immediately after glazing installation is complete.
  - C. Clean glass and adjacent surfaces after sealants are fully cured.
  - D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.
- 3.08 PROTECTION
  - A. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

# SECTION 08 9100 LOUVERS

## PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Louvers, frames, and accessories.
- **1.02 RELATED REQUIREMENTS** 
  - A. Section 07 6200 Sheet Metal Flashing and Trim.
  - B. Section 07 9200 Joint Sealants: Sealing joints between frames and adjacent construction.

#### 1.03 REFERENCE STANDARDS

- A. AAMA 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
- B. AMCA 511 Certified Ratings Program for Air Control Devices; 2010.

### 1.04 SUBMITTALS

- A. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- B. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.
- C. Samples: Submit two samples 2 by 2 inches in size illustrating finish and color of exterior and interior surfaces.
- D. Test Reports: Independent agency reports showing compliance with specified performance criteria.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

#### 1.06 WARRANTY

- A. Provide twenty year manufacturer warranty against distortion, metal degradation, and failure of connections.
  - 1. Finish: Include coverage against degradation of exterior finish.

### PART 2 PRODUCTS

- 2.01 MANUFACTURERS
  - A. Louvers:
    - 1. Airolite Company, LLC; Model SCH501: www.airolite.com.
    - 2. Construction Specialties, Inc; Model RSH-5700: www.c-sgroup.com.
    - 3. Substitutions: See Section 01 6000 Product Requirements.

## 2.02 LOUVERS

- A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
- B. Stationary Storm-Resistant Louvers: Horizontal blade, extruded aluminum construction, with intermediate mullions matching frame.
  - 1. Free Area: 43%, minimum.
  - 2. Blades: Airfoil-shaped.
  - 3. Frame: 5 inches deep, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
  - 4. Aluminum Thickness: Frame 12 gage, 0.0808 inch minimum; blades 12 gage, 0.0808 inch minimum.
  - 5. Aluminum Finish: Superior performing organic coatings; finish welded units after fabrication.

## 2.03 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- 2.04 FINISHES
  - A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
    - 1. Polyvinylidene fluoride (PVDF) multi-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness of 0.9 mil; color and gloss as indicated on drawings.

### 2.05 ACCESSORIES

- A. Blank-Off Panels: Aluminum face and back sheets, polyisocyanurate foam core, 1-1/2 inch thick, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.
- B. Bird Screen: Interwoven wire mesh of aluminum, 14 gage, 0.0641 inch diameter wire, 1/2 inch open weave, diagonal design.
- C. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.
- D. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

# PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.
- B. Verify that field measurements are as indicated.

### 3.02 INSTALLATION

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Install louvers level and plumb.
- C. Set sill members and sill flashing in continuous bead of sealant.
- D. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- E. Secure louver frames in openings with concealed fasteners.

F. Coordinate with installation of mechanical ductwork.

## 3.03 CLEANING

- A. Strip protective finish coverings.
- B. Clean surfaces and components.

## SECTION 09 0561

## COMMON WORK RESULTS FOR FLOORING PREPARATION

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. This section applies to all floors identified in the contract documents as to receive the following types of floor coverings:
  - 1. Resilient tile and sheet.
  - 2. Carpet tile.
  - 3. Thin-set ceramic tile and stone tile.
- B. Preparation of new concrete floor slabs for installation of floor coverings.
- C. Testing of concrete floor slabs for moisture and alkalinity (pH).
- D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
  - 1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
- E. Remedial floor coatings.

### 1.02 PRICE AND PAYMENT PROCEDURES

- A. Unit Price for Remedial Floor Coating or Sheet Membrane: Do not include the cost of the floor coating or underlayment in the base bid; state on the bid form the unit price per square foot for the floor coating or underlayment, installed, in the event such remediation is required.
  - 1. Base the unit price on the assumption that the floor area to be treated is primarily open, not divided into rooms and corridors.

#### 1.03 REFERENCE STANDARDS

- A. ASTM C109/C109M Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2016a.
- B. ASTM C472 Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).
- C. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- D. ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.
- E. ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2016a.

#### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

### 1.05 SUBMITTALS

- A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
  - 1. Moisture and alkalinity (pH) limits and test methods.
  - 2. Manufacturer's required bond/compatibility test procedure.

- B. Testing Agency's Report:
  - 1. Description of areas tested; include floor plans and photographs if helpful.
  - 2. Summary of conditions encountered.
  - 3. Moisture and alkalinity (pH) test reports.
  - 4. Copies of specified test methods.
  - 5. Recommendations for remediation of unsatisfactory surfaces.
  - 6. Submit report directly to Owner.
  - 7. Submit report not more than two business days after conclusion of testing.
- C. Adhesive Bond and Compatibility Test Report.
- D. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
  - 1. Manufacturer's qualification statement.
  - 2. Manufacturer's statement of compatibility with types of flooring applied over remedial product.
  - 3. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
  - 4. Manufacturer's installation instructions.
  - 5. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.

### 1.06 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing will be performed by an independent testing agency employed and paid by Owner.
- B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
  - 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- C. Contractor's Responsibility Relating to Independent Agency Testing:
  - 1. Provide access for and cooperate with testing agency.
  - 2. Confirm date of start of testing at least 10 days prior to actual start.
  - 3. Allow at least 4 business days on site for testing agency activities.
  - 4. Achieve and maintain specified ambient conditions.
  - 5. Notify Owner when specified ambient conditions have been achieved and when testing will start.

### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

## 1.08 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

# PART 2 PRODUCTS

## 2.01 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
  - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
  - 2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
  - 1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
  - 2. Products:
    - a. Custom Building Products; TechMVC Moisture Vapor and Alkalinity Barrier: www.custombuildingproducts.com.

## PART 3 EXECUTION

- 3.01 CONCRETE SLAB PREPARATION
  - A. Perform following operations in the order indicated:
    - 1. Preliminary cleaning.
    - 2. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
    - 3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
    - 4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
    - 5. Patching, smoothing, and leveling, as required.
    - 6. Other preparation specified.
    - 7. Adhesive bond and compatibility test.
    - 8. Protection.
  - B. Remediations:
    - 1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
    - 2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
    - 3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that

adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

### 3.02 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.
- 3.03 MOISTURE VAPOR EMISSION TESTING
  - A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
  - B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
  - C. Test in accordance with ASTM F1869 and as follows.
  - D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
  - E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.
  - F. Report: Report the information required by the test method.

# 3.04 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.
- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

## 3.05 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
- C. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
- D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

## 3.06 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with requirements and recommendations of floor covering manufacturer.
- C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- D. Do not fill expansion joints, isolation joints, or other moving joints.

## 3.07 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

## 3.08 APPLICATION OF REMEDIAL FLOOR COATING

A. Comply with requirements and recommendations of coating manufacturer.

## 3.09 PROTECTION

A. Cover prepared floors with building paper or other durable covering.

## **SECTION 09 2116**

### **GYPSUM BOARD ASSEMBLIES**

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Gypsum sheathing.
- E. Cementitious backing board.
- F. Gypsum wallboard.
- G. Joint treatment and accessories.

### 1.02 RELATED REQUIREMENTS

- A. Section 05 4000 Cold-Formed Metal Framing: Exterior wind-load-bearing metal stud framing.
- B. Section 06 1000 Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 07 2100 Thermal Insulation: Acoustic insulation.
- D. Section 07 8400 Firestopping: Top-of-wall assemblies at fire rated walls.
- E. Section 07 9200 Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

### 1.03 REFERENCE STANDARDS

- A. ASTM C475/C475M Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- B. ASTM C645 Standard Specification for Nonstructural Steel Framing Members; 2014.
- C. ASTM C754 Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.
- D. ASTM C840 Standard Specification for Application and Finishing of Gypsum Board; 2016.
- E. ASTM C954 Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- F. ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.
- G. ASTM C1047 Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- H. ASTM C1177/C1177M Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- I. ASTM C1280 Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2013a.
- J. ASTM C1325 Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units; 2017.
- K. ASTM C1396/C1396M Standard Specification for Gypsum Board; 2014.

- L. ASTM C1629/C1629M Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.
- M. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- N. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- O. ASTM E413 Classification for Rating Sound Insulation; 2016.
- P. GA-216 Application and Finishing of Gypsum Board; 2016.
- Q. GA-226 Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 2016.
- R. UL (FRD) Fire Resistance Directory; current edition.

### 1.04 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- D. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.
- 1.05 QUALITY ASSURANCE
  - A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing.

## PART 2 PRODUCTS

- 2.01 GYPSUM BOARD ASSEMBLIES
  - A. Provide completed assemblies complying with ASTM C840 and GA-216.1. See PART 3 for finishing requirements.
  - B. Interior Partitions: Provide completed assemblies with the following characteristics:
    - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
  - C. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
    - 1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).
      - a. Refer to Drawings for UL Assembly Numbers.

## 2.02 METAL FRAMING MATERIALS

- A. Manufacturers Metal Framing, Connectors, and Accessories:
  - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
  - 2. Marino: www.marinoware.com.
  - 3. Phillips Manufacturing Company: www.phillipsmfg.com.
  - 4. Substitutions: See Section 01 6000 Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.

- 1. Studs: "C" shaped with flat or formed webs with knurled faces.
- 2. Runners: U shaped, sized to match studs.
- 3. Ceiling Channels: C-shaped.
- 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
- C. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05 4000.
- D. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- E. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and screwed to secondary deflection channel set inside but unattached to top track.

## 2.03 BOARD MATERIALS

- A. Manufacturers Gypsum-Based Board:
  - 1. CertainTeed Corporation: www.certainteed.com.
  - 2. Georgia-Pacific Gypsum: www.gpgypsum.com.
  - 3. National Gypsum Company: www.nationalgypsum.com/#sle.
  - 4. USG Corporation: www.usg.com.
  - 5. Substitutions: See Section 01 6000 Product Requirements.
- B. Abuse Resistant Wallboard:
  - 1. Application: Partitions and ceilings, unless otherwide noted.
  - 2. Surface Abrasion: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
  - 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  - 4. Type: Fire resistance rated Type X, UL or WH listed.
  - 5. Thickness: 5/8 inch.
  - 6. Edges: Tapered.
  - 7. Products:
    - a. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board.
    - b. National Gypsum Company; Gold Bond eXP Interior Extreme AR Gypsum Panel.
    - c. USG; Fiberrock AquaTough Interior Panels.
    - d. Substitutions: See Section 01 6000 Product Requirements.
- C. Backing Board For Wet Areas:
  - 1. Application: Surfaces behind tile in wet areas including shower room tile installations.
  - 2. Application: Exterior soffits where textured acrylic finish systems are indicated.
  - 3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9-SystemDeleted or ASTM C1325.
    - a. Thickness: 1/2 inch.
    - b. Products:
      - 1) Custom Building Products; Wonderboard: www.custombuildingproducts.com.
      - 2) National Gypsum Company; PermaBase Cement Board: www.nationalgypsum.com/#sle.
      - 3) USG Corporation; Durock Brand Cement Board: www.usg.com.
      - 4) Substitutions: See Section 01 6000 Product Requirements.
- D. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
  - 1. Application: Vertical surfaces behind thinset tile, except in wet areas.
  - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

- 3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
- 4. Type: Type X, in locations indicated.
- 5. Type X Thickness: 5/8 inch.
- 6. Edges: Tapered.
- 7. Products:
  - a. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board
  - b. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.
  - c. USG; Fiberock Aqua-Tough Interior Panel.
  - d. Substitutions: See Section 01 6000 Product Requirements.
- E. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
  - 1. Application: Exterior sheathing, unless otherwise indicated.
  - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  - 3. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
  - 4. Core Type: Type X, as indicated.
  - 5. Type X Thickness: 5/8 inch.
  - 6. Edges: Square.
  - 7. Glass Mat Faced Products:
    - a. Georgia-Pacific Gypsum; DensGlass Sheathing.
    - b. National Gypsum Company; Gold Bond eXP Sheathing.
    - c. CertainTeed Corporation; GlasRoc Brand.
    - d. Substitutions: See Section 01 6000 Product Requirements.

### 2.04 ACCESSORIES

- A. Acoustic Insulation: As specified in Section 07 2100.
- B. Acoustic Sealant: As specified in Section 07 9200; Type 5.
- C. Finishing Accessories: ASTM C1047, paper-faced galvanized steel, unless noted otherwise.1. Types: As detailed or required for finished appearance.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
  - 1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
  - 2. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
  - 3. Chemical hardening type compound.
- E. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
- F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- G. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.
- H. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

# PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that project conditions are appropriate for work of this section to commence.
- 3.02 FRAMING INSTALLATION
  - A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
  - B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
    - 1. Level ceiling system to a tolerance of 1/1200.
    - 2. Laterally brace entire suspension system.
  - C. Studs: Space studs at 16 inches on center.
    - 1. Extend partition framing to structure in all locations.
    - 2. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
  - D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
  - E. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
    - 1. Orientation: Horizontal.
    - 2. Spacing: At 16 inches on center.
  - F. Blocking: Install wood blocking for support of:
    - 1. Framed openings.
    - 2. Wall mounted cabinets.
    - 3. Plumbing fixtures.
    - 4. Toilet partitions.
    - 5. Toilet accessories.
    - 6. Wall mounted door hardware.
    - 7. Handrails and wall brackets.
    - 8. Display cases, markerboards, tack boards.

## 3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
  - 1. Place two beads continuously on substrate before installation of perimeter framing members.
  - 2. Place continuous bead at perimeter of each layer of gypsum board.
  - 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

### 3.04 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board parallel to framing, with ends and edges occurring over firm bearing.

- C. Double-Layer Non-Rated: Use gypsum board for first layer, placed perpendicular to framing or furring members, with ends and edges occurring over firm bearing. Place second layer parallel to framing or furring members. Offset joints of second layer from joints of first layer.
- D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
  - 1. Seal joints, cut edges, and holes with water-resistant sealant.
- F. Exterior Soffits: Install exterior soffit board perpendicular to framing, with staggered end joints over framing members or other solid backing.
  - 1. Seal joints, cut edges, and holes with water resistant sealant.
- G. Cementitious Backing Board: Install over steel framing members where indicated, in accordance with ANSI A108.11-SystemDeleted and manufacturer's instructions.
- H. Installation on Metal Framing: Use screws for attachment of gypsum board.
- I. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

# 3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

# 3.06 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, bedded with chemical hardening type joint compound and finished with chemical hardening type joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
  - 2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
  - 3. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
- E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

## 3.07 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

# **SECTION 09 5100**

## ACOUSTICAL CEILINGS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.
- C. Accessories

### 1.02 RELATED REQUIREMENTS

- A. Section 07 9200 Joint Sealants: Acoustical sealant.
- B. Section 21 1300 Fire-Suppression Sprinkler Systems: Sprinkler heads in ceiling system.
- C. Section 23 3700 Air Outlets and Inlets: Air diffusion devices in ceiling.
- D. Section 26 5100 Interior Lighting: Light fixtures in ceiling system.
- E. Section 27 5116 Public Address Systems: Speakers in ceiling system.

## 1.03 REFERENCE STANDARDS

- A. ASTM C635/C635M Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- B. ASTM C636/C636M Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- C. ASTM E580/E580M Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.
- D. ASTM E1264 Standard Classification for Acoustical Ceiling Products; 2014.

### 1.04 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

### 1.05 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components, acoustical units, and other related components.
- C. Samples: Submit two samples 12 x 12 inch (305 x 305 mm) or of size illustrating material and finish of acoustical units.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and related work.

### 1.06 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

### 1.07 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

### 1.08 PROJECT CONDITIONS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Install acoustical units after interior wet work is dry.

## 1.09 EXTRA MATERIALS

A. Provide 1/2 of 1 percent of total acoustical unit area of each type of acoustical unit for Owner's use in maintenance of project.

## PART 2 PRODUCTS

- 2.01 MANUFACTURERS
  - A. Acoustic Tiles/Panels:
    - 1. Armstrong World Industries, Inc: www.armstrong.com.
    - 2. CertainTeed Corporation: www.certainteed.com.
    - 3. USG: www.usg.com.
    - 4. Substitutions: See Section 01 6000 Product Requirements.
  - B. Suspension Systems:
    - 1. Same as for acoustical units.

## 2.02 ACOUSTICAL UNITS

- A. Acoustical Units General: ASTM E1264, Class A.
- B. Acoustical Panels Type 1: Painted mineral fiber, ASTM E1264 Type III, with the following characteristics:
  - 1. Size: 24 by 24 inches.
  - 2. Thickness: 3/4 inches.
  - 3. Composition: Wet formed.
  - 4. NRC Range: .70, determined as specified in ASTM E 1264.
  - 5. Ceiling Attenuation Class (CAC): 35, determined as specified in ASTM E1264.
  - 6. Edge: Square.
  - 7. Surface Color: White.
  - Suspension System: Exposed grid Type 1. USG - Radar ClimaPlus High NRC/CAC Item No. 22521
     a. CAC: 35 to 40.
  - 9. Products:
    - a. USG Radar ClimaPlus High NRC/CAC Item No. 22521.
    - b. Armstrong Fine Fissured 1713.
    - c. Substitutions: See Section 01 6000 Product Requirements.
  - 10. Location: Classrooms and Offices- typical, unless otherwise noted
- C. Acoustical Panels Type 2: NOT USED.
- D. Acoustical Panels Type 2A: Painted mineral fiber, ASTM E 1264 Type 1 with the following characteristics:
  - 1. Size: 24 by 24 inches.
  - 2. Thickness: 3/4 inches.

- 3. Composition: Wet formed.
- 4. NRC Range: 50 to.60, determined as specified in ASTM E1264.
- 5. Ceiling Attenuation Class (CAC): 33, determined as specified in ASTM E1264.
- 6. Edge: Square.
- 7. Surface Color: White.
- 8. Surface Pattern: coarse texture.
- 9. Product:
  - a. Armstrong Armatuff 861.
  - b. USG Rock Face ClimaPlus 56335.
- 10. Suspension System: Exposed grid Type 2.
- 11. Location: Toilet Rooms, fieldhouse, other areas as noted.

## 2.03 SUSPENSION SYSTEM(S) AND PERIMETER TRIM

- A. Suspension Systems General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- B. Exposed Steel Suspension System Type 1: Formed galvanized steel, commercial quality cold rolled; intermediate-duty.
  - 1. Profile: Tee; 15/16 inch wide face.
  - 2. Construction: Double web.
  - 3. Finish: White painted.
  - 4. Product: Prelude XL by Armstrong;
    - a. DX by USG.
    - b. Substitutions: See Section 01 6000 Product Requirements.
- C. Exposed Steel Suspension System Type 2: Where this designation is indicated, provide acoustical panel ceiling suspension system complying with the following:
  - 1. Products:
    - a. ZXLA; USG
    - b. Prelude Plus; Armstrong
  - 2. Wide-Face, Capped, Double-Web, Hot-Dip Galvanized-Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet hot-dip galvanized according to ASTM A 653/A 653M, G60 (Z180) coating designation, with pre-finished, 15/16-inch-(24-mm-) wide, aluminum caps on flanges; other characteristics as follows:
    - a. Aluminum Cap Finish: Painted white.

### 2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
  - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- C. Acoustical Insulation: Specified in Section 07 2100.
- D. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.
  - 1. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834 and the following requirements:

- Product is effective in reducing airborne sound transmission through perimeter joints a. and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- Available Products: Subject to compliance with requirements, products that may be 2. incorporated into the Work include, but are not limited to, the following: a.
  - Acoustical Sealant for Exposed and Concealed Joints:
    - PL Acoustical Sealant; Chemrex, Inc., Contech Brands. 1)
    - AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp. 2)
    - SHEETROCK Acoustical Sealant; United States Gypsum Co. 3)
- E. Gasket For Perimeter Moldings: Closed cell rubber sponge tape.
- F. Touch-up Paint: Type and color to match acoustical and grid units.

# **PART 3 EXECUTION**

- 3.01 EXAMINATION
  - A. Verify existing conditions before starting work.
  - B. Verify that layout of hangers will not interfere with other work.

# 3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected ceiling plans.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- Do not eccentrically load system or induce rotation of runners. I.
- Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with J. other interruptions.
  - 1. Install in bed of acoustical sealant or with continuous gasket.
  - 2. Use longest practical lengths.
  - Miter corners. 3
- K. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
  - Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of 1. moldings before they are installed.
  - Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and 2. not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a

tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m). Miter corners accurately and connect securely.

- 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- L. Form expansion joints . Form to accommodate plus or minus 1 inch movement. Maintain visual closure.
- M. Install light fixture boxes constructed of gypsum board or acoustical panel above light fixtures in accordance with fire rated assembly requirements and light fixture ventilation requirements.
- N. Suspend ceiling hangers from building's structural members and as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.
  - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
  - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  - 5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, powder-actuated fasteners, or drilled-in anchors that extend through forms into concrete.
  - 6. Do not attach hangers to steel deck tabs.
  - 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  - 8. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches (200 mm) from ends of each member.
- O. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- P. Install special brake-metal shapes at window heads so that they are square and finished to provide a precise fit. Do not use exposed fasteners.
- Q. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
  - 1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
  - 2. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
  - 3. Paint cut panel edges remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
  - 4. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated or required.

## 3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Lay directional patterned units with pattern parallel to longest room axis.
- D. Fit border trim neatly against abutting surfaces.
- E. Install units after above-ceiling work is complete.
- F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- G. Cutting Acoustical Units:
  - 1. Cut to fit irregular grid and perimeter edge trim.
  - 2. Make field cut edges of same profile as factory edges.
  - 3. Double cut and field paint exposed reveal edges.
- H. Where round obstructions, bullnose concrete block corners, and other similar conditions occur, provide preformed closures to match perimeter molding.
- I. Lay acoustical insulation for a distance of 48 inches either side of acoustical partitions.
- J. Install hold-down clips on panels within 20 ft of an exterior door, and the following locations:
  - 1. Locker Rooms
  - 2. Large Group Toilet Rooms

## 3.04 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

# SECTION 09 6500 RESILIENT FLOORING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

### 1.02 RELATED REQUIREMENTS

A. Section 09 0561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

### 1.03 REFERENCE STANDARDS

- A. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- B. ASTM F1861 Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).

## 1.04 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- B. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- C. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each resilient flooring product specified.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  1. Extra Flooring Material: 100 square feet of each type and color.

### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- D. Protect roll materials from damage by storing on end.
- E. Do not double stack pallets.

### 1.06 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

### PART 2 PRODUCTS

### 2.01 TILE FLOORING

- A. Vinyl Enhanced Tile: Types RT-1:
  - 1. Product: Azrock Color Essence by Johnsonite
  - 2. Complies with requirements for ASTM F 1066, Class 3 (Surface Pattern) Standard Specification for Vinyl Composition Floor Tile
  - 3. Wear layer/Overall thickness: 1/8" (3.2 mm)

- 4. Tile size: 12" x 12" (30.5 x 30.5 cm)
- 5. Slip Resistance: ADA Compliant
- 6. Polyurethane Reinforced wear surface with Tritonite Finish
- 7. ASTM F 970, Standard Test Method for Static Load Limit 400 PSI (modified for higher load)
- 8. ASTM E 648, Standard Test method for Critical Radiant Flux of 0.45 watts/cm2 or greater, Class I
- 9. Warranty: 10 year Manufacturer's Warranty
- 10. Phthalate-free
- 11. 100% Recyclable

## 2.02 RESILIENT BASE

- A. Resilient Base Type RB-1: <u>ASTM F1861</u>, <u>Type TS rubber</u>, <u>vulcanized thermoset</u>; top set Style <u>B</u>, <u>Cove</u>.
  - 1. Manufacturers:
    - a. Johnsonite, a Tarkett Company: www.johnsonite.com.
    - b. Substitutions: See Section 01 6000 Product Requirements.
  - 2. Height: 4 inch.
  - 3. Thickness: 0.125 inch.
  - 4. Finish: Satin.

## 2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
- C. Moldings, Transition and Edge Strips: Same material as flooring.
- D. Sealer and Wax: Types recommended by flooring manufacturer.

## PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
  - B. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
    - 1. Test in accordance with Section 09 0561.
    - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

## 3.02 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 09 0561.
- 3.03 INSTALLATION GENERAL
  - A. Starting installation constitutes acceptance of sub-floor conditions.
  - B. Install in accordance with manufacturer's written instructions.
  - C. Spread only enough adhesive to permit installation of materials before initial set.
  - D. Fit joints and butt seams tightly.
  - E. Set flooring in place, press with heavy roller to attain full adhesion.

- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- I. Install flooring in recessed floor access covers, maintaining floor pattern.

## 3.04 INSTALLATION - TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.
- C. Install plank tile with a random offset of at least 6 inches from adjacent rows.

## 3.05 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.

## 3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

### 3.07 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

## **SECTION 09 6566**

## **RESILIENT ATHLETIC FLOORING**

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Rubber tile flooring, adhesively installed.
- B. Accessories.

### 1.02 RELATED REQUIREMENTS

- A. Section 03 3000 Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- B. Section 09 0561 Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, cleaning, and preparation.
- C. Section 09 6500 Resilient Flooring.

## 1.03 REFERENCE STANDARDS

 A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

### 1.04 SUBMITTALS

- A. Product Data: Manufacturer's printed data sheets for products specified.
- B. Selection Samples: Manufacturer's color charts for flooring materials specified, indicating full range of colors and textures available.

## 1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer certified in writing by the flooring manufacturer to be qualified for installation of specified flooring system.
- 1.06 DELIVERY, STORAGE, AND HANDLING
  - A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
  - B. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

### 1.07 FIELD CONDITIONS

A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70-95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

## PART 2 PRODUCTS

- 2.01 PREFORMED ATHLETIC FLOORING
  - A. RUBBER GYM FLOOR, Typr RGF-2: Prefabricated resilient rubber athletic flooring, calendered and vulcanized with a base of natural and synthetic rubbers, stabilizing agents and pigmentation. as manufactured by Mondo Luxembourg S.A. or approved equal.
    - 1. Product: Sport Impact as manufactured by Mondo; www.mondousa.com
      - a. Phthalate-free, halogen-free, heavy metal-free, formaldehyde-free, isocyanate-free and BPA-free.
    - 2. Thickness: 0.375" (10 mm).

- 3. Colors: Selected from standard, solid background colors with random marbleization throughout wear layer.
- 4. Surface Texture: Smooth.
- 5. Manufactured in two layers which are vulcanized together. The shore hardness of the top layer will be greater than that of the other layers; shore hardness of layers to be recommended by the Manufacturer and the limits specified.
- 6. Substitutions: See Section 01 6000 Product Requirements.

## 2.02 ACCESSORIES

- A. Leveling Compound: Latex-modified cement formulation as recommended by flooring manufacturer for substrate conditions.
- B. Flooring Adhesive: Waterproof; types recommended by flooring manufacturer.

## PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
  - 1. Test in accordance with ASTM F710.
  - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- D. Verify that concrete sub-floor surfaces are dry enough and ready for resilient flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

### 3.02 PREPARATION

A. Prepare floor substrates for installation of flooring in accordance with Section 09 0561.

## 3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Comply with manufacturer's recommendations.
- C. Rubber Tile Flooring:
  - 1. Lay out center lines in spaces to receive tile flooring, based on location of principal walls. Start tile installation from center, and adjust as necessary to avoid tiles less than one-half width at perimeter.
  - 2. Lay tiles square with room axis, matching for color and pattern by selecting from cartons and mixing as recommended by manufacturer.

### 3.04 CLEANING

A. Clean flooring using methods recommended by manufacturer.

## 3.05 PROTECTION

A. Protect finished athletic flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion.

## **SECTION 09 6700**

### **TROWELED SEAMLESS FLOORING**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Troweled seamless flooring and base.

### 1.02 REFERENCE STANDARDS

- A. ASTM D570 Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).
- B. ASTM D638 Standard Test Method for Tensile Properties of Plastics; 2014.
- C. ASTM D 695 Standard Test Method for Compressive Properties of Rigid Plastics; 2008.
- D. ASTM D905 Standard Test Method for Strength Properties of Adhesive Bonds in Shear by Compression Loading; 2008 (Reapproved 2013).
- E. ASTM D4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser; 2014.
- F. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- G. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- H. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

## 1.03 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.
- B. Samples for verification: Submit two samples, 4 x 4 inch in size illustrating color and pattern for each floor material for each color specified.
- C. Manufacturer's Installation Instructions: Indicate special procedures.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section.
  - 1. Minimum three years of documented experience.
  - 2. Approved by manufacturer.
- C. Supervisor Qualifications: Trained by product manufacturer, under direct full time supervision of manufacturer's own foreman.

### 1.05 MOCK UP

- A. Construct mock-up(s) of fluid applied flooring to serve as basis for evaluation of texture and workmanship.
  - 1. Number of Mock-Ups to be Prepared: One per product type.
  - 2. Use same materials and methods for use in the work.
  - 3. Locate where directed.
- B. Obtain approval of mock-up by Architect before proceeding with work.
C. Approved mock-up may remain as part of the Work.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store resin materials in a dry, secure area.
- B. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- 1.07 FIELD CONDITIONS
  - A. Maintain minimum temperature in storage area of 55 degrees F.
  - B. Store materials in area of installation for minimum period of 24 hours prior to installation.
  - C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

## PART 2 PRODUCTS

- 2.01 MATERIALS
  - A. Troweled Seamless Flooring and Base, 3/16" nominal thickness:
    - 1. Physical Characteristics:Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E 648.
      - a. Tensile Strength: 1,000 psi, when tested in accordance with ASTM D 638.
      - b. Compressive Strength: 5,000 psi (34.45 MPa) , when tested in accordance with ASTM C 579.
      - c. Abrasion Resistance: Maximum weight loss of 03 g/1000 cycles, when tested in accordance with ASTM D 4060.
      - d. Impact Resistance: >160 in/lb; no cracking, chipping or delamination, when tested with Gardner Impact Tester.
    - 2. Manufacturers and products Type RF-1:
      - a. Stonhard; Product: Stontec TRF: www.stonhard.com
        - 1) Primer: Urethane.
        - 2) Base Coat: 1/8 inch thick four-component, troweled 100 percent solids urethane mortar system.
        - 3) Undercoat: A two-component, 100 percent solids epoxy bonding coat.
        - 4) Color Flake Broadcast Layer: Brightly colored vinyl flakes.
        - 5) Sealer: Stonseal CA7, a two-component, UV resistant, aliphatic polyaspartic urethane sealer.
      - b. Dex-O-Tex: Product: Decor-Flor Troweled Epoxy Floor
        - 1) Bondcoat Primer, squeege, roler or brush applied.
        - 2) Decor-Flor II trowel applied with colored quartz aggregate, 3/16 inch thick.
        - 3) Groutcoat with Decor-Flor II
        - 4) Dex-O-Tex Aero\_Flor 100 finish coat, an aliphatic polyester urethane sealer.
    - 3. Manufacturers and products Type RF-2:
      - a. Stonhard; Product: Stonshield UTS: www.stonhard.com
      - b. Description: self-priming, textured, four-component, polyurethane mortar and broadcast system consisting of a urethane-urea binder, pigments, powders and quartz aggregates.
      - c. Thickness: nominal 1/4 in. (6 mm)
      - d. Mortar: Stonclad UT, four-component multi-functional urethane area slurry.
      - e. Aggregate: brightly colored quartz broadcast aggregate.

f. Undercoat and Sealer: Stonseal CA7, a two-component, UV resistant, aliphatic polyaspartic urethane sealer.

#### 2.02 ACCESSORIES

- A. Divider Strips: Zinc, 1/8 inch thick, height to match flooring thickness, with anchoring features; color as selected.
- B. Control Joint Strips: Match divider strips; 1/8 inch nominal width, 1/8 inch wide neoprene filler strip between side strips, with anchoring features, strip height to suit flooring thickness.
- C. Base Caps, and Separator Strips: Match divider strips, with projecting base of 1/8 inch.
- D. Subfloor Filler: type recommended by flooring material manufacturer.
- E. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

#### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive flooring.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive flooring.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of materials to sub-floor surfaces.
- D. Verify that concrete sub-floor surfaces are ready for flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by flooring materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

#### 3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.
- D. Apply primer to surfaces required by flooring manufacturer.
- 3.03 INSTALLATION STRIPS
  - A. Accurately saw cut substrate to install divider strips.
  - B. Install strips straight and level to locations indicated.
  - C. Install fillet strips at base of walls where flooring is to be extended up wall as base.

#### 3.04 INSTALLATION - FLOORING

- A. Apply in accordance with manufacturer's instructions.
- B. Apply each coat to minimum thickness required by manufacturer.
- C. Finish to smooth level surface.
- D. Mortar: Mix mortar material according to manufacturer's recommended procedures. Uniformly spread mortar over substrate at manufacturer's recommended height using specially designed trowel and or Screed box.

- E. Undercoat: Remove any surface irregularities by lightly abrading and vacuuming the floor surface. Mix and apply undercoat with strict adherence to manufacturer's installation procedures and coverage rates.
- F. Broadcast: Immediately broadcast quartz silica aggregate into the undercoat using manufacturer's specially designed spray caster. Strict adherence to manufacturer's installation procedures and coverage rates is imperative.
- G. Apply topcoat in number of coats indicated for flooring system and at spreading rates recommended in writing by manufacturer.
- H. Cove at vertical surfaces. Base height: 6" unless otherwise indicated.
- 3.05 TERMINATIONS
  - A. Chase edges to "lock" the flooring system into the concrete substrate along lines of termination.
  - B. Penetration Treatment: Lap and seal the flooring system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.
  - C. Trenches: Continue flooring system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.
  - D. Treat floor drains by chasing the flooring system to lock in place at point of termination.

#### 3.06 JOINTS AND CRACKS

- A. Treat control joints to bridge potential cracks and to maintain monolithic protection.
- B. Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.
- C. Discontinue floor coating system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

#### 3.07 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Barricade area to protect flooring until fully cured.

## SECTION 09 6813 TILE CARPETING

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

#### 1.02 RELATED REQUIREMENTS

- A. Section 03 3000 Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- B. Section 09 0561 Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

#### 1.03 REFERENCE STANDARDS

- A. ASTM D2859 Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006 (Reapproved 2011).
- B. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- C. CRI (GLP) Green Label Plus Testing Program Certified Products; www.carpet-rug.org; current edition.
- D. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

#### 1.04 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- B. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- C. Manufacturer's Installation Instructions: Indicate special procedures.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 6000 Product Requirements, for additional provisions.
  - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

#### 1.06 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

#### PART 2 PRODUCTS

#### 2.01 MATERIALS

A. Walk-off Carpet Tile, Type WCT -1, WCT-2: Tufted, manufactured in one dye lot.

- 1. Product: Traverse, manufactured by Mannington.
- 2. Tile Size: 24 by 24 inch, nominal.
- 3. Construction: Tip-Sheared Loop
- 4. Face Fiber: Type 6,6 Nylon
- 5. Dye Method: Solution / Yarn
- 6. Gauge: 5/32
- 7. Stitches Per Inch: 9.0
- 8. Pile Thickness: .142 Inches
- 9. Finished Yarn Weight: 38 Ounces Per Square Yard
- 10. Critical Radiant Flux: Minimum of 0.45 watts/sq cm, when tested in accordance with ASTM E 648 or NFPA 253.
- 11. Color: To be selected.
- 2.02 ACCESSORIES
  - A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.
  - B. Edge Strips: Rubber, color as selected.

#### PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
  - B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
  - C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
    - 1. Test in accordance with Section 09 0561.
  - D. Verify that concrete sub-floor surfaces are dry enough and ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by carpet tile manufacturer and adhesive materials manufacturer.
  - E. Verify that required floor-mounted utilities are in correct location.

#### 3.02 PREPARATION

A. Prepare floor substrates for installation of flooring in accordance with Section 09 0561.

#### 3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction alternating to next unit, set parallel to building lines, unless otherwise indicated.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

## 3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

# **SECTION 09 9000**

## PAINTS AND COATINGS

#### PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Surface preparation.
  - B. Field application of paints, stains, and other coatings.
  - C. Surfaces to be finished are indicated in this section and on the Drawings.

#### 1.02 RELATED REQUIREMENTS

- A. Section 05 5000 Metal Fabrications: Shop-primed items.
- 1.03 REFERENCE STANDARDS
  - A. 40 CFR 59, Subpart D National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- 1.04 SUBMITTALS
  - A. Product Data: Provide complete list of all products to be used, with the following information for each:
    - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - B. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
  - C. Samples: Submit one paper "drawdown" sample, 8-1/2 by 11 inches in size, illustrating colors selected for each finishing product specified.
    - 1. Where sheen is specified, submit samples in only that sheen.
- 1.05 QUALITY ASSURANCE
  - A. Applicator Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.
  - B. Material Safety Data Sheets: At project site maintain file of MSDS sheets for each product used; become familiar with and follow manufacturer's stated application and safety requirements.
- 1.06 MOCK-UP
  - A. Provide wall panel, 8 feet long by 10 feet wide, illustrating coating color, texture, and finish.
  - B. Locate where directed.
  - C. Mock-up may remain as part of the Work.
- 1.07 DELIVERY, STORAGE, AND HANDLING
  - A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
  - B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
  - C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.
- 1.08 FIELD CONDITIONS
  - A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.
- 1.09 EXTRA MATERIALS
  - A. Supply 1 gallon of each color; store where directed.
  - B. Label each container with color in addition to the manufacturer's label.

#### **PART 2 PRODUCTS**

- 2.01 MANUFACTURERS
  - A. Provide all paint and coating products used in any individual system from the same manufacturer.
  - B. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
  - C. In the event that a single manufacturer cannot provide all specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
  - D. Paints: Acceptable manufacturers are limited to the following:
    - 1. Benjamin Moore & Co: www.benjaminmoore.com.
    - 2. Sherwin-Williams: www.sherwin-williams.com.
  - E. Substitutions: See Section 01 6000 Product Requirements.
- 2.02 MATERIALS GENERAL
  - A. Volatile Organic Compound (VOC) Content:
    - 1. Provide coatings that comply with the most stringent requirements specified in the following:
      - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
      - b. Ozone Transport Commission (OTC) Model Rule, Architectural, Industrial, and Maintenance Coatings; www.otcair.org; specifically:
        - 1) Opaque, Flat: 50 g/L, maximum.
        - 2) Opaque, Nonflat: 150 g/L, maximum.
        - 3) Opaque, High Gloss: 250 g/L, maximum.
        - 4) Varnishes: 350 g/L, maximum.
      - c. Architectural coatings VOC limits of State in which the project is located.
    - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
  - B. Provide ready mixed paints and coatings.
  - C. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

#### 2.03 PAINT SYSTEMS

- A. Provide Premium Grade systems (2 top coats).
- B. Provide colors as directed by Architect.
  - 1. Allow for minimum of five colors for each system, unless otherwise indicated, without additional cost to Owner.
  - 2. Extend colors to surface edges; colors may change at any edge as directed by Architect.

#### 2.04 EXTERIOR PAINT SYSTEMS

- A. SYSTEM E-1:
  - 1. Substrate: Structural Steel and Metal Fabrications:
  - 2. Applications include but are not limited to miscellaneous metal boxes and structural steel.
  - 3. Manufacturers and products:
    - a. Sherwin Williams:
      - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series
      - 2) 2nd Coat: S-W A-100 Exterior Latex Gloss, A8 Series
      - 3) 3rd Coat: S-W A-100 Exterior Latex Gloss, A8 Series
      - b. Benjamin Moore:
        - 1) 1st Coat: Moore PO6 Super Spec HP Alkyd Metal Primer
        - 2) 2nd Coat: 096 MoorGlo Acrylic Semi-Gloss House Paint
        - 3) 3rd Coat: 096 MoorGlo Acrylic Semi-Gloss House Paint

#### B. SYSTEM E-2:

- 1. Substrate: Hollow metal door frames:
- 2. Finish: Semi-Gloss.
- 3. Manufacturers and Products:
  - a. Sherwin Williams:
    - 1) 1st Coat: DTM Acrylic Primer/Finish, B66W1
    - 2) 2nd Coat:DTM Acrylic Gloss Coating, B66W100
    - 3) 3rd Coat: DTM Acrylic Gloss Coating, B66W100
  - b. Benjamin Moore:
    - 1) 1st Coat: Moorcraft Super Spec DTM Alkyd Satin, Z163
    - 2) 2nd Coat: Moorcraft Super Spec Urethane Gloss Enamel, Z22
    - 3) 3rd Coat: Moorcraft Super Spec Urethane Gloss Enamel, Z22
- C. SYSTEM E-3:
  - 1. Substrate: Galvanized Metal, Not Chromate Passivated:
  - 2. Applications include but are not limited to railings, lintels and bollards.
  - 3. Manufacturers and Products:
    - a. Sherwin Williams:
      - 1) 1st Coat:S-W Pro Industrial Pro-Cryl® Primer, B66-310 Series
      - 2) 2nd Coat:S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series
      - 3) 3rd Coat:S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series

#### b. Benjamin Moore:

- 1) 1st Coat: Moore P04 Super Spec HP Acrylic Metal Primer
- 2) 2nd Coat: Moore N096 MoorGlo Acrylic Semi-Gloss House Paint
- 3) 3rd Coat:Moore N096 MoorGlo Acrylic Semi-Gloss House Paint

#### 2.05 INTERIOR PAINT SYSTEMS

A. SYSTEM I-1:

- 1. Substrate: Concrete Masonry Units
- 2. Manufacturers and Products:
  - a. Sherwin Williams:
    - 1) 1st Coat:S-W PrepRite® Block Filler, B25W25
    - 2) 2nd Coat:S-W ProMar® 200 Latex Semi-Gloss, B20W2200 Series
    - 3) 3rd Coat:S-W ProMar® 200 Latex Semi-Gloss, B20W2200 Series
    - b. Benjamin Moore:
      - 1) 1st Coat:Moore 160 Super Spec Latex Block Filler
      - 2) 2nd Coat:333 Regal AquaGlo Acrylic Semi-Gloss Enamel
      - 3) 3rd Coat:333 Regal AquaGlo Acrylic Semi-Gloss Enamel
- B. SYSTEM I-2
  - 1. Substrate: Concrete Masonry Units (Epoxy paint, Semi-gloss finish)
  - 2. Manufacturers and Products:
    - a. Sherwin Williams:
      - 1) 1st Coat:S-W Heavy Duty Block Filler, B42W46
      - 2) 2nd Coat:S-W Pro Industrial HB/ Waterbased Epoxy, B71W111/B71W100 Series
      - 3) 3rd Coat:S-W Pro Industrial HB/ Waterbased Epoxy, B71W111/B71W100 Series
      - b. Benjamin Moore:
        - 1) 1st Coat: Super Spec HP Waterborne Epoxy Block Filler P31
        - 2) 2nd Coat:Super Spec HP Acrylic Epoxy Coating P43
        - 3) 3rd Coat:Super Spec HP Acrylic Epoxy Coating P43
- C. SYSTEM I-3
  - 1. Substrate: Structural Steel and Metal Fabrications:
  - 2. FInish: Semi-Gloss.
  - 3. Manufacturers and Products:
    - a. Sherwin Williams:
      - 1) 1st Coat: S-W Pro Industrial Pro-Cryl® Primer, B66-310 Series
      - 2) 2nd Coat: S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series
      - 3) 3rd Coat: S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series
    - b. Benjamin Moore:
      - 1) 1st Coat: Moore P04 Super Spec HP Acrylic Metal Primer
      - 2) 2nd Coat:N333 Regal AquaGlo Acrylic Semi-Gloss Enamel
      - 3) 3rd Coat: N333 Regal AquaGlo Acrylic Semi-Gloss Enamel
- D. SYSTEM I-4
  - 1. Substrate: Hollow metal door frames:
  - 2. Finish: Gloss.
  - 3. Manufacturers and Products:
    - a. Sherwin Williams:
      - 1) 1st Coat: DTM Acrylic Primer/Finish, B66W1
      - 2) 2nd Coat: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series.
      - 3) 3rd Coat: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series.
    - b. Benjamin Moore:
      - 1) 1st Coat: Corotech Acrylic Metal Primer V110.
      - 2) 2nd Coat:Corotech Acrylic DTM Enamel Semi-Gloss V331.
      - 3) 3rd Coat: Corotech Acrylic DTM Enamel Semi-Gloss V331.

- E. SYSTEM I-5
  - 1. Substrate: Galvanized Metal, Not Chromate Passivated:
  - 2. Applications include but are not limited to railings and exposed ductwork.
  - 3. Manufacturers and Products:
    - a. Sherwin WIlliams:
      - 1) 1st Coat:S-W Pro Industrial Pro-Cryl® Primer, B66-310 Series
      - 2) 2nd Coat:S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series
      - 3) 3rd Coat:S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series
    - b. Benjamin Moore:
      - 1) 1st Coat: Moore P04 Super Spec HP Acrylic Metal Primer
      - 2) 2nd Coat:N333 Regal AquaGlo Acrylic Semi-Gloss Enamel
      - 3) 3rd Coat:N333 Regal AquaGlo Acrylic Semi-Gloss Enamel

## F. SYSTEM I-6

- 1. Substrate: Woodwork (Opaque Semi-Gloss Finish)
- 2. Manufacturers and Products:
  - a. Sherwin Williams:
    - 1) 1st Coat: S-W Premium Wall & Wood Primer, B28W8111
    - 2) 2nd Coat: S-W Pro Industrial 0 VOC Semi-Gloss Acrylic B66W651 Series
    - 3) 3rd Coat:S-W Pro Industrial 0 VOC Semi-Gloss Acrylic B66W651 Series
    - b. Benjamin Moore:
      - 1) 1st Coat: Moore 023 Fresh Start 100 percent Acrylic Primer Sealer
      - 2) 2nd Coat:N333 Regal Acrylic Latex Semi-Gloss Enamel
      - 3) 3rd Coat: N333 Regal Acrylic Latex Semi-Gloss Enamel
- G. SYSTEM I-7
  - 1. Substrate: Woodwork (Transparent, Not Floors or Stairs):
  - 2. Applications include but are not limited to paneling and trim:
  - 3. Manufacturers and Products:
    - a. Sherwin Williams:
      - 1) Stain: S-W Minwax 250 VOC Oil Stain
      - 2) Sealer: Sher-Wood Natural Wood Filler
      - 3) 2nd Coat: S-W Wood Classics® Waterborne Polyurethane Varnish, Satin
      - 4) 3rd Coat: S-W Wood Classics® Waterborne Polyurethane Varnish, Satin
    - b. Benjamin Moore:
      - 1) Stain: Moore 234 Benwood Alkyd Wood Stain
      - 2) Sealer: Moore 413 Benwood Quick-Dry Alkyd Sanding Sealer
      - 3) 2nd Coat: 423 Benwood Stays Clear Acrylic Low Lustre Polyurethane
      - 4) 3rd Coat: 423 Benwood Stays Clear Acrylic Low Lustre Polyurethane
- H. SYSTEM I-8: NOT USED.
- I. SYSTEM I-9: NOT USED.
- J. SYSTEM I-10
  - 1. Substrate: Gypsum Board (Satin Finish):
  - 2. Applications include ceilings, soffits, and bulkheads.
  - 3. Manufacturers and Products:
    - a. Sherwin Williams:
      - 1) 1st Coat:S-W PrepRite 200 Int. Latex Primer, B28 Series
      - 2) 2nd Coat:S-W ProMar® 200 Latex Eggshell, B20Series

- 3) 3rd Coat:S-W ProMar® 200 Latex Semi-Gloss, B31Series
- b. Benjamin Moore:
  - 1) 1st Coat: Moore P04 Super Spec HP Acrylic Metal Primer
  - 2) 2nd Coat:N319 Regal Acrylic Latex Eggshell Finish Enamel
  - 3) 3rd Coat:N319 Regal Acrylic Latex Eggshell Finish Enamel
- K. SYSTEM I-11
  - 1. Substrate: Gypsum Board (Epoxy Finish):
  - 2. Applications include walls (typical).
  - 3. Manufacturers and Products:
    - a. Sherwin Williams:
      - 1) 1st Coat:PrepRite 200 Int Latex Primer
      - 2) 2nd Coat: ProIndustrial Precat. WB Epoxy, S-G, Series K45
      - 3) 3rd Coat:ProIndustrial Precat. WB Epoxy, S-G, Series K46
      - b. Benjamin Moore:
        - 1) 1st Coat: Benjamin Moore Ultra Spec 500 Interior Latex Primer N534
        - 2) 2nd Coat: Corotech Pre-Catalyzed Waterborne Epoxy Eggshell V342
        - 3) 3rd Coat: Corotech Pre-Catalyzed Waterborne Epoxy Eggshell V342
- L. SYSTEM I-12
  - 1. Substrate: Concrete Floor (Sealed):
  - 2. Manufacturers and Products:
    - a. W. R. Meadows:
      - 1) 1st Coat:CS-309/30 Concrete Curing and Sealing Compound

#### PART 3 EXECUTION

#### 3.01 SCOPE -- SURFACES TO BE FINISHED

- A. Paint all exposed surfaces except where indicated not to be painted or to remain natural; the term "exposed" includes areas visible through permanent and built-in fixtures when they are in place.
- B. Paint the surfaces described in PART 2, indicated on the Drawings, and as follows:
  - 1. If a surface, material, or item is not specifically mentioned, paint in the same manner as similar surfaces, materials, or items, regardless of whether colors are indicated or not.
  - 2. Paint surfaces behind movable equipment and furnishings the same as similar exposed surfaces.
  - 3. Paint surfaces to be concealed behind permanently installed fixtures, equipment, and furnishings, using primer only, prior to installation of the permanent item.
  - 4. Paint back sides of access panels and removable and hinged covers to match exposed surfaces.
  - 5. Finish top, bottom, and side edges of exterior doors the same as exposed faces.
  - 6. Paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment occurring in finished areas to match background surfaces, unless otherwise indicated.
  - 7. Paint shop-primed mechanical and electrical items occurring in finished areas.
  - 8. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
  - 9. Paint interior surfaces of air ducts and convector and baseboard heating cabinets with flat, nonspecular black paint where visible through registers, grilles, or louvers.
  - 10. Paint dampers exposed behind louvers, grilles, to match face panels.

- 11. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
- C. Do Not Paint or Finish the Following Items:
  - 1. Items fully factory-finished unless specifically noted; factory-primed items are not considered factory-finished.
  - 2. Items indicated to receive other finish.
  - 3. Items indicated to remain naturally finished.
  - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
  - 5. Polished and brushed stainless steel items.
  - 6. Brick, precast concrete, integrally colored plaster.
  - 7. Polished and brushed stainless steel, anodized aluminum, bronze, terne, and lead.
  - 8. Acoustical materials.
  - 9. Concealed piping, ductwork, and conduit.

#### 3.02 EXAMINATION

- A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials; report incompatible primer conditions and submit recommended changes for Architect's approval.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  - 1. Plaster and Gypsum Board: 12 percent.
  - 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
  - 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
- E. Measure the ph factor of concrete, masonry, and mortar before starting any finishing process.
  - 1. Report results in writing to Architect before starting work.
  - 2. If results of test indicates need for remedial action, provide written description of remedial action. If a different primer or paint systems is required, state the total cost of the change. Do not proceed with remedial action or change without receiving written authorization from Architect.

#### 3.03 PREPARATION

- A. Prepare surfaces as follows for the applicable surface and coating; if multiple preparation treatments are specified, use as many as necessary for best results; where external standards are referenced for preparation (e.g. SSPC standards), prepare as specified in those standards; comply with coating manufacturer's specific preparation methods or treatments, if any.
- B. Coordinate painting work with cleaning and preparation work so that dust and other contaminants do not fall on newly painted, wet surfaces.
- C. Surface Appurtenances: Prior to preparing surfaces or finishing, remove electrical plates, hardware, light fixtures, light fixture trim, escutcheons, machined surfaces, fittings, and similar items already installed that are not to be painted.
  - 1. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before preparation and finishing.
  - 2. After completing painting in each space or area, reinstall items removed using workers skilled in the trades involved.

- D. Surfaces: Correct defects and clean surfaces which affect work of this section.
- E. Marks: Seal with shellac those which may bleed through surface finishes.
- F. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Concrete, Cement Plaster and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- H. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- I. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- J. Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- K. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- L. Interior Wood Items to Receive Transparent Finish: Sand wood to obtain a uniform appearance before immediately starting work. Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.
- M. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.
- 3.04 APPLICATION
  - A. Apply products in accordance with manufacturer's instructions using the preparation, products, sheens, textures, and colors as indicated.
    - 1. Remove, refinish, or repaint work not complying with requirements.
  - B. Do not apply finishes over dirt, rust, scale, grease, moisture, scuffed surfaces, or other conditions detrimental to formation of a durable coating film; do not apply finishes to surfaces that are not dry.
  - C. Use applicators and methods best suited for substrate and type of material being applied and according to manufacturer's instructions.
  - D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate; provide total dry film thickness of entire system as recommended by manufacturer.
    - 1. Number of coats and film thickness required are the same regardless of application method.
    - 2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
    - 3. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.

# E. Apply finish to completely cover surfaces with uniform appearance without brush marks, runs, sags, laps, ropiness, holidays, spotting, cloudiness, or other surface imperfections.

- 1. Before applying finish coats, apply a prime coat of material recommended by manufacturer, unless the surface has been prime coated by others; where evidence of suction spots or unsealed areas in first coat appear, recoat primed and sealed surfaces to ensure finish coat with no burn through or other defects due to insufficient sealing.
- 2. Apply first coat to surface that has been cleaned, pretreated, or otherwise prepared as soon as practical after preparation and before subsequent surface deterioration.
- 3. Do not apply succeeding coats until the previous coat has cured as recommended by manufacturer.
- 4. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat will not cause the undercoat to lift or lose adhesion.
- 5. If manufacturer's instructions recommend sanding to produce a smooth, even surface, sand between coats.
- 6. Before applying next coat vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- 7. Pigmented (Opaque) Finishes: Provide smooth, opaque surface of uniform finish, color, appearance, and coverage.

#### 3.05 FIELD QUALITY CONTROL

- A. See Section 01 4000 Quality Requirements, for general requirements for field inspection.
- B. Owner will provide field inspection.
- 3.06 CLEANING AND PROTECTION
  - A. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.
  - B. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from site.
  - C. Protect other work, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting as approved by Architect.
  - D. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
  - E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

#### **SECTION 10 1101**

#### VISUAL DISPLAY BOARDS AND DISPLAY CASES

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Markerboards and Tackboards.
- 1.02 RELATED REQUIREMENTS
  - A. Section 06 1000 Rough Carpentry: Blocking and supports.

#### 1.03 REFERENCE STANDARDS

- A. ANSI A135.4 American National Standard for Basic Hardboard; 2012.
- B. ANSI A208.1 American National Standard for Particleboard; 2009.
- C. ASTM A424/A424M Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a.

#### 1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's data on markerboard, tackboard, tackboard surface covering, trim, and accessories.
- B. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
- C. Samples: Submit color charts for selection of color and texture of markerboard, tackboard, tackboard surface covering, and trim.
- D. Test Reports: Show conformance to specified surface burning characteristics requirements.
- E. Manufacturer's printed installation instructions.

#### 1.05 QUALITY ASSURANCE

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

#### 1.06 WARRANTY

A. Provide five year warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

#### PART 2 PRODUCTS

- 2.01 MANUFACTURERS
  - A. Visual Display Boards:
    - 1. Claridge Products and Equipment, Inc: www.claridgeproducts.com.
    - 2. Polyvision Corporation (Nelson Adams); Product Polyvision 500 Series P3 ceramicsteel boards: www.polyvision.com is the Basis of Design.
      - a. Fabricators shall be limited to those approved by manufacturer.

#### 2.02 VISUAL DISPLAY BOARDS

- A. Markerboards: Porcelain enamel on steel, laminated to core.
  - 1. Color: As selected from manufacturer's full range.
  - 2. Steel Face Sheet Thickness: 24 gage, 0.0239 inch.
  - 3. Core: Particleboard, 1/2 inch thick, laminated to face sheet.
  - 4. Backing: Aluminum foil, laminated to core.
  - 5. Size: As indicated on drawings.
  - 6. Frame: Extruded aluminum, with concealed fasteners.

- 7. Frame Profile: Box chalktray with end closures; 1 1/2" perimeter trim
- 8. Frame Finish: Anodized, natural.
- 9. Accessories: Provide chalk tray and map rail with 2" tack strip, hanging devices for audio-visual aids.
- B. Tackboards: Composition cork.
  - 1. Cork Thickness: 1/4 inch.
  - 2. Color: As selected from manufacturer's full range.
  - 3. Backing: Hardboard, 1/4 inch thick, laminated to tack surface.
  - 4. Size: As indicated on drawings.
  - 5. Frame: Same type and finish as for markerboard.
  - 6. Frame Profile: 1 1/2" perimeter trim.
  - 7. Frame Finish: Anodized, natural.
- C. Combination Units and Units Made of More Than One Panel: Factory-assembled markerboards and tackboards in a single frame, of materials specified above.
  - 1. Join panels of different construction with H-shaped extruded aluminum molding finished to match frame.
  - 2. Join panels of similar construction with butt joints, aligned and secured with steel spline concealed in edge of core.
  - 3. Configuration: As indicated on drawings.
  - 4. Units Too Large to Ship Assembled: Fully assembled in factory, then disassembled for shipping.
- 2.03 MATERIALS
  - A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.
  - B. Hardboard for Chalk Surface: ANSI A135.4, Tempered type.
  - C. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.
  - D. Foil Backing: Aluminum foil sheet, 0.005 inch thick.
  - E. Adhesives: Type used by manufacturer.

#### 2.04 ACCESSORIES

- A. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 2 inch wide, full width of frame.
- B. Map Supports: Formed aluminum sliding hooks and roller brackets to fit map rail. Provide 2 per board.
- C. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.
- D. Cleaning Instruction Plate: Provide instructions for chalkboard cleaning on a metal plate fastened to perimeter frame near chalkrail.
- E. Chalk Tray: Aluminum, manufacturer's standard profile, one piece full length of chalkboard, molded ends, concealed fasteners, same finish as frame.
- F. Mounting Brackets: Concealed.

#### PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that field measurements are as indicated.

- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.
- C. Verify flat wall surface for frameless adhesive-applied boards.

#### 3.02 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Install with top of chalk tray at 30 inches above finished floor, unless otherwise noted.
- C. Secure units level and plumb.
- D. Butt Joints: Install with tight hairline joints.

#### 3.03 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover with protective cover, taped to frame.
- C. Remove temporary protective cover at Date of Substantial Completion.

## **SECTION 10 2113**

#### PLASTIC TOILET COMPARTMENTS

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Solid plastic toilet compartments.
- B. Urinal screens.

#### 1.02 RELATED REQUIREMENTS

- A. Section 06 1000 Rough Carpentry: Blocking and supports.
- B. Section 10 2800 Toilet, Bath, and Laundry Accessories.

#### 1.03 REFERENCE STANDARDS

- A. ASTM A 666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2003.
- 1.04 SUBMITTALS
  - A. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
  - B. Product Data: Provide data on panel construction, hardware, and accessories.
  - C. Manufacturer's Installation Instructions: Indicate perimeter conditions requiring special attention.

#### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Plastic Toilet Compartments:
  - 1. Metpar Corp: www.metpar.com.
  - 2. Scranton Products (Santanta/Comtec/Capital): www.scrantonproducts.com.com.
  - 3. General Partitions
  - 4. Substitutions: Section 01 6000 Product Requirements.

#### 2.02 COMPONENTS

- A. Toilet Compartments: Solid molded plastic panels, doors, and pilasters, floor-mounted headrail-braced.
  - 1. Color: Single color as selected.
- B. Door and Panel Dimensions:
  - 1. Thickness: 1 inch.
  - 2. Door Width: 24 inch.
  - 3. Door Width for Handicapped Use: 36 inch, out-swinging.
  - 4. Height: 58 inch.
  - 5. Thickness of Pilasters: 1 inch.
- C. Urinal Screens: Wall mounted with continuous panel brackets, and floor-to-ceiling vertical upright consisting of pilaster anchored to floor and ceiling.

#### 2.03 ACCESSORIES

- A. Pilaster Shoes: Formed ASTM A 666, Type 304 stainless steel with No. 4 finish, 3 in high, concealing floor fastenings.
  - 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

- B. Head Rails: Hollow anodized aluminum tube, 1 x 1-5/8 inch size, with anti-grip strips and stainless steel wall brackets.
- C. Pilaster Brackets: Satin stainless steel.
- D. Wall Brackets: Continuous type, satin stainless steel.
  - 1. Urinal screen wall brackets: continuous, extruded aluminum.
- E. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
  - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- F. Hardware: Satin stainless steel:
  - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
  - 2. Nylon bearings.
  - 3. Door Latch: Slide type with exterior emergency access feature.
  - 4. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
  - 5. Coat hook with rubber bumper; one per compartment, mounted on door.
  - 6. Provide door pull for outswinging doors.
  - 7. Provide additional door pull at interior of outswinging doors of accessible stalls.

#### PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify that field measurements are as indicated.
  - B. Verify correct spacing of and between plumbing fixtures.
- 3.02 INSTALLATION
  - A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
  - B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
  - C. Attach panel brackets securely to walls using anchor devices.
  - D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
  - E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

#### 3.03 ADJUSTING

- A. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- B. Adjust adjacent components for consistency of line or plane.

## **SECTION 10 2800**

## TOILET ACCESSORIES

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Commercial shower accessories.
- C. Electric hand dryers.

#### 1.02 RELATED REQUIREMENTS

- A. Section 06 1000 Rough Carpentry: Concealed supports for accessories, including in wall framing and plates and above ceiling framing.
- B. Section 10 2113.19 Plastic Toilet Compartments.

#### 1.03 REFERENCE STANDARDS

- A. ASTM A269/A269M Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015.
- B. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ASTM C1036 Standard Specification for Flat Glass; 2011.

#### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

#### 1.05 SUBMITTALS

- A. See Section 01 3000 Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

#### **PART 2 PRODUCTS**

- 2.01 MANUFACTURERS
  - A. Basis of Design Products listed are made by Bobrick Washroom Equipment, Inc., www.bobrick.com.
  - B. Other Approved Manufacturers for Commercial Toilet Accessories:
    - 1. Bradley Corporation: www.bradleycorp.com.
    - 2. Substitutions: Section 01 6000 Product Requirements.

#### 2.02 MATERIALS

- A. Accessories General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

- E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- F. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- G. Adhesive: Two component epoxy type, waterproof.
- H. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.
- I. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

#### 2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

#### 2.04 TOILET ACCESSORIES

- A. Item A: Mirrors: Stainless steel framed, 6 mm thick laminated glass mirror.
  - 1. Product: Bobrick B-290 series, manufactured by Bobrick.
  - 2. Size: As shown.
  - 3. Frame: 0.05 inchangle shapes, with mitered and welded and ground corners, and tamperproof hanging system; No.4 finish.
- B. Item B: Toilet Paper Dispenser: Triple roll, surface mounted, for coreless type rolls, provided by vendor, installed by contractor.
  - 1. Products:
    - a. Hillyard Product No. PAP42527.
- C. Item C: NOT USED.
- D. Item D: Roll Towel Dispenser: Single roll, surface mounted bracket type, black translucent plastic coverprovided by vendor, installed by contractor.
  - 1. Products:
    - a. Hillyard Product No. PAP42819.
- E. Item E: Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
  - 1. Product: B-270 manufactured by Bobrick.
- F. Item F: Soap Dispenser: Manual soap dispenser, wall-mounted, surface, with black plastic cover and vertical tank and working parts; push type soap valve, check valve, and window gage refill indicator.
  - 1. Products:
    - a. Hillyard Product No. HIL22281.
- G. Item G: Grab Bars: Stainless steel, 1-1/4 inches outside diameter, minimum 0.05 inch wall thickness, nonslip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
  - 1. Product: B-5806.99 series manufactured by Bobrick.
  - 2. Length and configuration: As indicated on drawings.
- H. Item H: Electric Hand Dryer:
  - 1. Product: XLerator Automatic Hand Dryer.
    - a. Model: XL-W: Surface mounted with white metal cover.
    - b. Electrical: 120v. 60 Hz.

- c. Cover: Die-cast zinc alloy; One-piece, heavy-duty, rib-reinforced, lightweight, unbreakable, rustproof; all exposed surfaces shall be bright chrome plated or finished with chip-proof, electrostatically applied epoxy paint.
- d. Provide stainless steel ADA recess kit
- e. Provide noise reduction nozzle
- 2. Stainless Steel Backsplash: Provide stainless steel sheet behind electric hand dryer, extending from top of hand dryer to top of wall base, 16 inches wide, with hemmed edges and concealed fasteners.
- I. Item I: Waste Receptacle: Wall-mounted, stainless steel, continuously welded bottom pan, seamless exposed flanges, and hemmed top edge.
  - 1. Liner: Removable, heavy-duty vinyl liner, attached at a minimum of 4 points with stainless steel grommets and hooks.
  - 2. Minimum capacity: 12 3/4 gallons.
  - 3. Product: B-277 manufactured by Bobrick.
- J. Item J: Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
  - 1. Hooks: 2, 0.06 inch stainless steel rag hooks at shelf front.
  - 2. Mop/broom holders: 3 spring-loaded rubber cam holders at shelf front.
  - 3. Length: Manufacturer's standard length for number of holders/hooks.
- K. Item K: Heavy-Duty Shower Curtain Rod
  - 1. Product: Bobrick Model B-207, 36" length.
- L. Item L: Heavy-Duty Shower Curtain Rod
  - 1. Product: Bobrick Model B-207, 60" length; cut to length as required.
- M. Item M: Stainless Steel Shower Curtain Hooks
  - 1. Product: Bobrick Model 204-1
- N. Item N: Vinyl Shower Curtains
  - 1. Product: Bobrick Models 204-2 and 204-3.
- O. Item P: Robe Hook
  - 1. Product: Bobrick Model B-76717.
- P. Item Q: Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, hinges and mechanical fasteners of Type 304 stainless steel, rectangular seat.
  - 1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of color as selected.
  - 2. Size: ADA compliant for roll-in showers, 28.5 inches x 15 inches.
  - 3. Product: Model 9562 manufactured by Bradley Corp..

#### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.

#### 3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

#### 3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

## 3.04 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

## **SECTION 10 4400**

## FIRE PROTECTION SPECIALTIES

#### PART 1 GENERAL

- 1.01 SECTION INCLUDES
  - A. Fire extinguishers.
  - B. Fire extinguisher cabinets.
  - C. Accessories.
- 1.02 RELATED REQUIREMENTS
  - A. Section 06 1000 Rough Carpentry: Wood blocking product and execution requirements.
- 1.03 REFERENCE STANDARDS
  - A. NFPA 10 Standard for Portable Fire Extinguishers; 2013.
  - B. UL (DIR) Online Certifications Directory; current listings at database.ul.com.

#### 1.04 SUBMITTALS

- A. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- B. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

#### 1.05 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

#### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Fire Extinguishers, Fire Extinguisher Cabinets and Accessories:
  - 1. JL Industries, Inc: www.jlindustries.com.
  - 2. Larsen's Manufacturing Co: www.larsensmfg.com.
  - 3. Potter-Roemer: www.potterroemer.com.
  - 4. Elkhart.
  - 5. Substitutions: See Section 01 6000 Product Requirements.

#### 2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
  - 1. Provide extinguishers labeled by UL (DIR) for purpose specified and as indicated.
- B. Dry Chemical Type Fire Extinguishers: Cast steel tank, with pressure gage.
  - 1. Class ABC.
  - 2. Size 10 pound multi-purpose.
  - 3. Finish: Baked enamel, color as selected..

#### 2.03 FIRE EXTINGUISHER CABINETS

- A. Metal: Formed primed steel sheet.
- B. Cabinet Configuration: Recessed.
  - 1. Size to accommodate accessories.

- 2. Exterior nominal dimensions of 12 inch wide x 27 inch high x 8 inch deep.
- 3. Trim: Flat.
- 4. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.
- C. Door: 1/2 inch thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with continuous piano hinge.
- D. Door Style and lock: Recess mounted, vertical duo style, 18 gauge pressed steel construction with Duo-Panel doors and emergency safety locks (such as Larsen-Loc/Saf-T-lok).
- E. Verify that cabinets are sized to accommodate extinguishers.
- F. Door Glazing: Float glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.
- G. Lettering: Vertical, die cut, red.
- H. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- I. Weld, fill, and grind components smooth.
- J. Finish of Cabinet Exterior Trim and Door: No. 4 Brushed stainless steel.
- K. Finish of Cabinet Interior: White colored enamel.
- 2.04 ACCESSORIES
  - A. Extinguisher Brackets: Formed steel, chrome-plated.
- 2.05 ADDITIONAL EQUIPMENT
  - A. Provide 4 Dry Chemical Type fire extinguishers and brackets in addition to those shown on contract documents.

#### PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Verify existing conditions before starting work.
  - B. Verify rough openings for cabinet are correctly sized and located.
- 3.02 INSTALLATION
  - A. Install in accordance with manufacturer's instructions.
  - B. Install cabinets plumb and level in wall openings.
  - C. Secure rigidly in place.
  - D. Place extinguishers in cabinets.

## SECTION 10 5100 METAL LOCKERS

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Metal bases, tops, filler panels, and related components.
- **1.02 RELATED REQUIREMENTS** 
  - A. Section 03 3000 Cast-in-Place Concrete: Concrete base construction.
  - B. Section 06 1000 Rough Carpentry: Wood blocking and nailers.

#### 1.03 REFERENCE STANDARDS

- A. ASTM A 1008 Standard Specification for Steel Sheet, Carbon, Cold-Rolled, Commercial Quality.
- B. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

#### 1.04 SUBMITTALS

- A. Product Data: Manufacturer's published data on locker construction, sizes and accessories.
- B. Shop Drawings: Indicate locker plan layout and numbering plan.
- C. Samples: Submit two samples 12 by 12 inches in size, of each color scheduled.
- D. Manufacturer's Installation Instructions: Indicate component installation assembly.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect locker finish and adjacent surfaces from damage.

#### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Metal Lockers:
  - 1. ASI Lockers: www.asilockers.com
  - 2. Lyon Workspace Products: www.lyonworkspace.com.
  - 3. Penco Products, Inc: www.pencoproducts.com.
  - 4. Substitutions: See Section 01 6000 Product Requirements.

#### 2.02 MATERIALS

- A. Sheet Steel: ASTM A1008, commercial grade, stretcher level, phosphatized; to the following minimum thicknesses:
  - 1. Body and Shelf: 16 gage.
  - 2. Door: 14 gage.
  - 3. Sloping Top: 18 gage.
  - 4. Trim: 18 gage. (vertical and/or recess)
- B. Locker Benches: Free standing type; bench top of laminated maple species wood, stained, sealed and varnished; pedestals of painted steel.

#### 2.03 LOCKER UNITS

- A. Metal Lockers Type 'A'
  - 1. Basis of Design: ASI Storage Solutions Competitor Collection
  - 2. Location: Fieldhouse Officials Locker Rooms
  - 3. Type of Lockers: Knocked Down.

- 4. Double Tier:
  - a. Height: 66 inches (1676 mm).
  - b. Size: 12 inches (305 mm) wide by 12 inches (305 mm) deep.
- 5. Base: Install lockers on concrete bases.
- 6. Material: Steel parts shall be mild cold tolled commercial quality steel, ASTM A1008.
- 7. Finish: Steel surfaces shall be power washed, phosphate treated and finished with an electrostatically applied 2 mm thick hybrid epoxy/polyester powder coating and baked.
- 8. Construction: Lockers shall be built on a unitized principle with common intermediate uprights separating units.
- 9. Door Frames: 16 gauge formed in a channel shape. Vertical members shall have additional flange to provide a continuous door strike. Cross frame members; 16 gauge channel shaped
  - a. Double Tier Lockers: Include intermediate cross frames.
- 10. Doors: 14 gauge with diamond perforations, channel shaped on both the lock and hinge side, with angle formations across the top and bottom.
  - a. Double tier lockers shall have an additional 16 gauge full height reinforcement channel
- 11. Ventilation: Locker sides and doors 20 inches (508 mm) or higher shall be perforated with diamond-shaped openings 3/4 inch (19 mm) wide by 1-1/2 inches (38 mm) high in a quantity and pattern to ensure maximum ventilation and maintain structural strength. Doors less than 20 inches (508 mm) high shall have small diamond-shaped perforations 7/16 inch (11 mm) wide by 15/16 inch (24 mm) high.
- 12. Body:
  - a. Backs: 18 gauge.
  - b. Bottoms, Tops, Sides, and Shelves: 16 gauge.
  - c. Bolt spacing shall not exceed 9 inches (228 mm) o.c.
- 13. Hinges: Full length 16 gauge continuous piano type, riveted to both door and frame.
- 14. Handles: One-piece 20 gauge deep drawn stainless steel cup designed to accommodate locks.
- 15. Latching: An 11 gauge frame hook shall be secured to the fame. The frame shall have a padlock hasp protruding through the recessed handle. A rubber silencer shall be firmly secured to the frame at each latch hook.
- 16. Interior Equipment:
  - a. Double Tier lockers shall have three wall hooks and one ceiling hook
- 17. Number Plates: Each locker shall have a polished aluminum number plate riveted to door face with black numerals 1/2 inch (12 mm) high.
- 18. Assembly:
  - a. Knocked Down: All locker components shall be assembled with nuts and bolts.
- 19. Accessories:
  - a. Continuous sloped top with end fillers.
- B. Metal Lockers Type 'B'
  - 1. Basis of Design: ASI Storage Solutions Pro Collection
  - 2. Location: Fieldhouse Team Locker Rooms
  - 3. Type of Lockers: Welded.
  - 4. Single Tier:
    - a. Height: 72 inches (1829 mm).
    - b. Size: 24 inches (610 mm) wide by 18 inches (457 mm) deep.
  - 5. Base: Install lockers on concrete bases.

- 6. Material: Steel parts shall be mild cold tolled commercial quality steel, ASTM A1008.
- 7. Finish: Steel surfaces shall be power washed, phosphate treated and finished with an electrostatically applied 2 mm thick hybrid epoxy/polyester powder coating and baked.
- 8. Construction: Lockers shall be built on a unitized principle.
- 9. Door Frames: 16 gauge formed in a channel shape. Vertical members shall have additional flange to provide a continuous door strike. Cross frame members; 16 gauge channel shaped
  - a. Single Tier Lockers: Include intermediate cross frames.
- 10. Doors: 14 gauge with diamond perforations, channel shaped on both the lock and hinge side, with angle formations across the top and bottom.
  - a. Single tier lockers shall have an additional 16 gauge full height reinforcement channel.
- 11. Ventilation: Open front; side shall be diamond perforated.
- 12. Body:
  - a. Tops, sides, and shelves shall be 16 gauge.
  - b. Backs: 18 gauge.
  - c. Bottoms shall be 16 gauge and shall have two welded reinforcement channels.
  - d. Bolt spacing shall not exceed 9 inches (228 mm) o.c.
- 13. Interior Equipment: Each locker shall have one coat rod, two coat rod holders and two single wall hooks.
- 14. Number Plates: Each locker shall have a polished aluminum number plate riveted to door face with black numerals 1/2 inch (12 mm) high.
- 15. Assembly:
  - a. Factory Assembly: All locker components shall be assembled with rivets.
- 16. Security Box: 14 gauge lockable door with a 16 gauge side panel. The door shall be attached to a welded frame with a continuous hinge. The door shall have a recessed handle. Security box door frame members shall not be less than 16 gauge formed to a channel shape. Vertical members shall have an additional flange to provide a continuous door strike.
- 17. Footlocker: Front footlocker panel shall include a single point latch with padlock strike plate and mini louvers. Footlocker top shall have a continuous hinge. Opening and closing shall be quieted by rubber bumpers mounted to the contact points. Seat shall be strengthened with two reinforcement channels welded to bottom of seat. Two side seat supports shall be fastened to side panels and inserted in a support tab on the front locker panels for added strength.
- 18. Accessories: Continuous sloped top with end fillers.

#### 2.04 LOCKER COMPONENTS

- A. Doors: Hollow edge construction, 1-3/16 inch thick, welded construction, channel reinforced top and bottom with intermediate stiffener ribs, grind and finish edges smooth.
- B. Recessed stainless steel handle with latch arrangement for locks & number plate. Provide quiet operation by encasing exposed portion of the lifting trigger in a molded ABS thermoplastic cover that provides isolation from metal-to-metal contact and be contained in a formed 20 gauge stainless steel recessed pocket; or similar means.
- C. Number Plates: Provide rectangular shaped aluminum plates. Form numbers of block font style with ADA designation, in contrasting color.
- D. Fabricate sloped metal tops, ends and closure pieces.
- E. Provide perforated end panels and filler strips.

#### 2.05 ACCESSORIES

- A. Locker Benches: Free standing type; 1-1/4 inch bench top of laminated maple species wood, stained, sealed and varnished; pedestals of painted steel, maximum 60 inch spacing.
  - 1. Sizes: As shown.
- 2.06 FINISHING
  - A. Paint locker units in colors to be selected from manufacturer's standard color selection.

#### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that prepared bases are in correct position and configuration.
- B. Verify bases and embedded anchors are properly sized.

#### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install lockers plumb and square.
- C. Place and secure on locker base. Minimum pull out force 100lbs.
- D. Bolt adjoining locker units together to provide rigid installation.
- E. Install end panels, filler panels, sloped tops, miscellaneous panels, and other necessary related components.
- F. Install accessories.
- G. Replace components that do not operate smoothly.
- 3.03 CLEANING
  - A. Clean locker interiors and exterior surfaces.

#### **SECTION 12 3600**

#### COUNTERTOPS, BACKSPLASHES AND WINDOW STOOLS

#### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Countertops for manufactured casework.
- B. Wall-hung counters and vanity tops.
- C. Solid surface window stools.
- D. Solid surface thresholds.

#### 1.02 REFERENCE STANDARDS

- A. ANSI A208.1 American National Standard for Particleboard; 2009.
- B. ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. AWI/AWMAC/WI (AWS) Architectural Woodwork Standards; 2014.
- D. AWMAC/WI (NAAWS) North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- E. ISFA 2-01 Classification and Standards for Solid Surfacing Material; 2013.
- F. NEMA LD 3 High-Pressure Decorative Laminates; 2005.
- G. PS 1 Structural Plywood; 2009.

#### 1.03 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Specimen warranty.
- B. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- C. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- F. Installation Instructions: Manufacturer's installation instructions and recommendations.
- G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

#### 1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.
- 1.05 DELIVERY, STORAGE, AND HANDLING
  - A. Store products in manufacturer's unopened packaging until ready for installation.
  - B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

#### 1.06 FIELD CONDITIONS

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

## PART 2 PRODUCTS

#### 2.01 COUNTERTOPS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Solid Surfacing Countertops, Window Stools and Thresholds: Solid surfacing sheet or plastic resin casting over continuous substrate.
  - 1. Flat Sheet Thickness: 1/2 inch, minimum.
  - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
    - a. Manufacturers:
      - 1) Avonite Surfaces: www.avonitesurfaces.com.
      - 2) Dupont: www.corian.com.
      - 3) Formica Corporation: www.formica.com.
    - b. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
    - c. Color and Pattern: As indicated on drawings.
  - 3. Other Components Thickness: 1/2 inch, minimum.
  - 4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; eased edge.
  - 5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
  - 6. Wall Protection above Backsplash: Same sheet material without substrate, adhered directly to wall surface as shown.
    - a. Thickness: 1/4 inch.
  - 7. Thresholds: As indicated on drawings.
- C. Stainless Steel Countertops: ASTM A666, Type 304, stainless steel sheet; 16 gage, 0.0625 inch nominal sheet thickness.
  - 1. Finish: 4B satin brushed finish.
  - 2. Exposed Edge Shape: Straight turndown with return; 1-1/2 inch high face, 1/2 inch return to face of case; reinforced with hardwood or steel.
  - 3. Back and End Splashes: Same material; welded 1/4 inch radius coved joint to countertop; square top edge with 1 inch wide top surface and minimum 1/2 inch turndown.
  - 4. Splash Dimensions: 4 inch high by 1 inch thick, unless otherwise indicated.

#### 2.02 MATERIALS

- A. Wood-Based Components:
  - 1. Wood fabricated from old growth timber is not permitted.
  - 2. Provide sustainably harvested wood, certified or labeled as specified in Section 01 6000 Product Requirements.
- B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- C. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.

- D. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- E. Joint Sealant: Mildew-resistant silicone sealant, clear.

#### 2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
  - 1. Join lengths of tops using best method recommended by manufacturer.
  - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
  - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
  - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
  - 2. Height: 4 inches, unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
- D. Stainless Steel: Fabricate tops up to 144 inches long in one piece including nosings and back and end splashes; accurately fitted mechanical field joints in lengths over that dimension are permitted.
  - 1. Weld joints; grind smooth and polish to match.
  - 2. Provide stainless steel hat channel stiffeners, welded or soldered to underside, where indicated on drawings.
  - 3. Provide wall clips for support of back/end splash turndowns.
  - 4. Sound Deadening: Apply water resistant, fire resistant sound deadening mastic to entire bottom surface.
- E. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

#### PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Do not begin installation until substrates have been properly prepared.
  - B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
  - C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

#### 3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- 3.03 INSTALLATION
  - A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
  - B. Attach stainless steel countertops using stainless steel fasteners and clips.

COUNTERTOPS, BACKSPLASHES AND WINDOW STOOLS Revision 0 - 03/05/2018 C. Seal joint between back/end splashes and vertical surfaces.

#### 3.04 CLEANING

- A. Clean countertops surfaces thoroughly.
- 3.05 PROTECTION
  - A. Protect installed products until completion of project.
  - B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

Fairview Campus – New Middle and High School

## SECTION 12 9300 ATHLETIC EQUIPMENT

## PART 1 - GENERAL

#### 1.1 <u>RELATED WORK SPECIFIED ELSEWHERE</u>

- A. General Conditions, Special Conditions and section "Scope of Work" are a part of and govern work under this section.
- B. Jump pit drain and infill material
  - a. Section 31 2000 Earth Moving.
- C. Paving:
  - a. Section 32 1216 Asphalt Paving
  - b. Section 32 1313 Concrete Paving

#### D. Synthetic running surface

- a. Section 32 1824 Synthetic Running Track Surfacing.
- E. Grass, Synthetic turf carpet system, shock pad and aggregate base layer construction
  - a. Section 32 1800 Synthetic Turf Shock Pad
  - b. Section 32 1813 Synthetic Turf Carpet
  - c. Section 32 3114 Subgrade and Stone Aggregate Drainage Layer
  - d. Section 32 9200 Grass Athletic Field Construction

#### 1.2 <u>SUBMITTALS</u>

- A. Shop Drawings: Submit four (4) sets to the Architect for approval. Drawings shall show the jointing and bonding, connections with other work, typical and special anchoring of the sections, dimensions and other necessary information. All equipment specified shall be permanently anchored in concrete as per manufacturer's instructions or as detailed.
- B. Product Data: Submit manufacturer's technical data and installation instructions.

#### 1.3 <u>GUARANTEE</u>

A. Contractor shall also guarantee the work of this section against defective materials and/or workmanship for a period of one (1) year from date of

acceptance by the Owner.

## PART 2 - PRODUCTS

## 2.1 <u>EQUIPMENT</u>

A. The following equipment shall be as manufactured by Aluminum Athletic Equipment Company, West Conshohocken, PA 19428, (1-800-523-5471), or approved equal, as Sports Edge, Troutman, NC (1-800-334-6057) or Sports Field Specialties, Delhi, NY (1-800-975-3343):

Name	No.	Qty.
(1) Goal Posts (8' offset)	ASG-HS	6
(2) Aluminum Vault Box	AVB	1
(3) Aluminum Shot Put Circle	SC2	1
(4) Aluminum Shot Put	ATCB	1
Stopboard		
(5) Aluminum Discus Circle	DC2	1
(6) Bases (Set of 3)	M500	6
(7) Home Plate	BH88	6
(8) Pitching Rubber	BH81	6
(9) Soccer Goal	SGR-P	6
(10) Field Hockey Goal	FHG	4
(11) Field Hockey Net	FHN	4
(12) Lacrosse Goal (Pair)	LG	2
(13) Lacrosse Net (Individual)	LNP	4

## PART 3 - EXECUTION

## 3.1 <u>ERECTION</u>

- A. All athletic equipment, and related items, shall be furnished and installed in accordance with the manufacturer's printed instructions, the specifications and as detailed. A letter to this effect shall be submitted by the Contractor to the Owner upon completion of the work.
- B. Upon completion, clean all exposed surfaces and repair all defective joints as required; leave all work clean and free from surface dirt or imperfections.
  Protect all work of this section from all construction damage, during and after installation until acceptance by the Owner.
Appoquinimink School District Bid Package E – Outbuildings, Fields and Finish Sitework Fairview Campus – New Middle and High School

- - E N D - -

# **SECTION 13 3413**

## FABRICATED GREENHOUSE

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Manufacturer-engineered, shop-fabricated structural building frame.
- B. Glass wall and roof glazing including manufacturer's standard gutters and downspouts.
- C. Exterior doors, louvers, and vents.
- D. Gas-fired heaters, exhaust fans, air flow fans, evaporative cooling system, and environmental controller.
- E. Irrigation system.
- F. Greenhouse benches

### 1.02 REFERENCE STANDARDS

- A. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- B. ASTM B 221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
- C. ASTM B-308 Standard Specification for Aluminum-Alloy 6061-TS Standard Structural Shapes.
- D. ASTM E 773 Standard Test Method for Accelerated Weathering of Sealed IG Units Standard Specification for the Classification
- E. ASTM E 774 Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units
- F. AWS A2.4 Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- G. AWS D1.1/D1.1M Structural Welding Code Steel; 2015 (Errata 2016).
- H. NGMA Standards for Design Loads in Greenhouse Structures, Ventilating and Cooling Greenhouses and Greenhouse Heat Loss Standards.
- I. Aluminum Association Design Manual Specification for Aluminum Structures.
- 1.03 ADMINISTRATIVE REQUIREMENTS
  - A. Preinstallation Meeting: Convene two weeks before starting work of this section.
- 1.04 SUBMITTALS
  - A. See Section 01 3000 Administrative Requirements, for submittal procedures.
  - B. Product Data: Provide data on profiles, component dimensions, fasteners and environmental equipment.
  - C. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, installation; framing anchor bolt settings, sizes, and locations from datum, foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths.
    - 1. Shop drawings shall be signed and sealed by a structural engineer licensed to practice in the State of Delaware.
  - D. Samples: Submit two samples of precoated metal panels for each color selected, 6 by 6 inch in size illustrating color and texture of finish.

- E. Manufacturer's Instructions: Indicate preparation requirements, anchor bolt placement.
- F. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.
- G. Project Record Documents: Record actual locations of concealed components and utilities.

### 1.05 QUALITY ASSURANCE

- A. Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this Work.
  - 1. Design Engineer Qualifications: Licensed in the State in which the Project is located.
  - 2. Conform to applicable code for submission of design calculations as required for acquiring permits. Refer to structural drawings for loading requirements.
  - 3. Cooperate with regulatory agency or authority and provide data as requested.
- B. Perform welding in accordance with AWS D1.1/D1.1M.
- C. Manufacturer Qualifications: The entire greenhouse structure shall be the product of a single manufacturer, and shall be a company specializing in the manufacture of products similar to those required for this project.
  - 1. Not less than 5 years of documented experience
- D. Erector Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

### 1.06 STORAGE AND HANDLING

- A. Handle and store all greenhouse materials with care, in accordance with manufacturer's instructions. Time delivery and erection of materials to avoid extended on-site storage. Store materials on skids or platforms; do not store directly on ground.
- 1.07 WARRANTY
  - A. Correct defective Work within a two year period after Date of Substantial Completion.
  - B. Provide two year manufacturer warranty for materials and workmanship.
    - 1. Include coverage for weather tightness of building enclosure elements after installation.

## PART 2 PRODUCTS

- 2.01 MANUFACTURERS
  - A. Basis of Design: Janco Greenhouses; 800-323-6933: www.jancogreenhouse.com.
  - B. Other Approved Manufacturers:
    - 1. Florian Solar Products, L.L.C.; 800-356-7426: www.floriangreenhouse.com.
    - 2. Substitutions: See Section 01 6000 Product Requirements.
- 2.02 STRUCTURE
  - A. Framing: Aluminum extrusion alloy, supported by heavy gauge aluminum I-beam frame with stainless-steel hardware or a hot-dipped galvanized steel sub-structure.
    - 1. Alloy and Temper of all framework members shall be of 6063-T5. Structural support members shall be as recommended for strength, corrosion resistance and application of required finish; ASTM B 221 for extrusions; ASTM B 209 for sheet/Plate.
    - 2. Framing members accept a "T" bolt & nut to hang accessories from the rigid frame.
  - B. Greenhouse structure shall be a metal frame gutter connected house. Structures shall conform to all conditions of these specifications, and overall dimensions and configuration shall conform to those shown on Drawings. The greenhouse elevation shown on drawings is

illustrative in nature - the greenhouse roof and other structural components shall be manufacturer's standard styles and profiles.

- C. Greenhouse columns shall be spaced and sized to provide a single span across the width of the greenhouse. Trusses between columns shall be adequate to support design dead, wind and snow loads as well as live loads indicated.
  - 1. Columns shall be a minimum of 8 feet apart along the length of the greenhouse. Factory punch or drill columns to attach required members.
- D. Fasteners shall be aluminum, non-magnetic stainless steel, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum components.

## 2.03 EXPANSION CONTROL

A. Suitable expansion joints shall be provided in all longitudinal members to take care of the longitudinal expansion in framing members. All members shall be so joined as to require each joint to handle the expansion in the individual member and to prevent an accumulation of expansion in several members in one direction.

## 2.04 KNEEWALL SILL FLASHING

A. Aluminum sill flashing shall be placed on the outside of the perimeter kneewall. Sill flashing shall be placed under the glazing sill and to the outside of the greenhouse column. Aluminum sill flashing shall extend no less than 2 inch down the vertical face of the kneewall. All sill corner flashing shall be shop welded. All sill flashing to be laid end to end with a 4 inch long splice cap matching the profile of the flashing. Set splice cap in sealant and hold in place with pop-rivets.

### 2.05 GUTTERS

A. Provide connections for gutter downspouts where indicated on drawing.

### 2.06 ROOF VENTILATION

- A. Greenhouse ventilation: continuous ridge vent along each side from end to end.
- B. Ridge vents are glazed with polycarbonate and are controlled by a thermostat and integrated into the overall climate control system.

### 2.07 SIDE VENT

- A. Automatic sidewall vents to be 36 inches high with a continuous socket hinge arranged to open out. Vents for each compartment shall be continuous from one end to the other. Vent shall be made up of a top rail, bottom rail and mullions of extruded aluminum. Bolt vent assembly together in accordance with the manufacturer's instructions.
- B. Design vents with weather tight hinges and weather tight fit between sash and vent headers.
- C. All vents shall have provisions at the hinge point to prevent creeping of the vents.

## 2.08 VENT OPERATORS

- A. All vents shall be operated with aluminum rack arms with zinc pinions.
- B. Provide minimum 14 gauge 1.315-inch diameter galvanized drive shaft.
- C. Provide rack and pinion arms with aluminum rack, zinc pinion gear and extruded aluminum housing assembly to keep rack and pinions in proper mesh and alignment. Racks attach to bottom rail of vents with aluminum clips and stainless steel cotter pins. No fewer than two sets of rack and pinion arms shall be provided for each bay per run of vents.
- D. Provide vent motors to operate motorized wall vents, with integral line voltage limit switches, Lock EWA series or approved equal.

### 2.09 VENT SCREENS

- A. Povide screens at all vent openings.
- B. Screen frames: assembled with die cast aluminum corners and designed to allow for re-screening of units in the field.
- C. Provide brush seals at ends of screen frames where vent operator arms penetrate.

### 2.10 GLAZING

- A. Glazing: Hermetically sealed, factory insulated, 1/8" tempered-over- 1/8" tempered, dual sealed, 7/8" O.A. thick at all flat glass and curved glass applications, made with a molecular sieve desiccant, primary seal of polyisobutylene and a secondary seal of polyurethane.
- B. Roof glass: PPG Super MC Low-E clear tempered over clear tempered safety glass,
- C. Vertical glass: PPG MC Low-E clear tempered over clear tempered safety glass, dual sealed.
- D. All glass to comply with the Insulated Glass Certification Council with ASTM E 773-83 and E 774-84a class CBA requirements (IGCC No. IGCC-514CBA)
- E. Glazing gaskets: E.P.D.M. (Ethylene Propylene Diene Polymer).

### 2.11 DOORS

- A. Doors: 1 <sup>3</sup>/<sub>4</sub>-inch by 3'0" by 6'-8" anodized with 5-inch extruded tube rails and 4-inch extruded aluminum tube frame with wool pile seals. Door rails and frame shall have a .125 inch minimum wall thickness.
- B. Hardware:
  - 1. Stainless steel hinges with non- removable pins, lever handles, closer, aluminum threshold and door sweep.
  - 2. Glazing: <sup>1</sup>/<sub>4</sub>-inch clear safety glazing. Bottom panel: aluminum faced panel.
- C. Doors shall be installed and pre-hung within extruded aluminum framing at all openings to the size required.

### 2.12 METAL BENCHES

- A. Provide stationary galvanized steel benches of the size and quantity shown on the Drawings. Bench supports shall be spaced at 6'-0" intervals maximum unless otherwise indicated on Drawings. Bench tops shall be single piece expanded metal. Provide leg bases that can be anchored to the floor.
- B. Side and end rails shall be extruded aluminum, 2 3/4 inches tall. Install safety plastic corner connectors at end rails on all bench top corners.
- C. Inset legs and top support rails a minimum of 3 inches on each side and 6 inches on the ends to facilitate movement in the aisles. Provide metal tubing to support bench tops above the support system. Provide metal bracing as required to stabilize the bench system.

## 2.13 EVAPORATIVE COOLING SYSTEM

- A. Evaporative cooling system shall be the product of a single supplier and shall include all components for a complete, operational installation.
  - 1. Include shutter, ducting, and water connect kits.
  - 2. Combined design shall have capacity for 13,000 CFM.
  - 3. System shall be controlled by environmental controller.
- B. The evaporative cooling system shall consist of a high pressure fog system including pump(s), filters, controls, gauges, all necessary piping and valves, fog nozzles, solenoid valves, and any other equipment and components required for a complete installation, including any necessary

water treatment equipment. The fog system shall generate 10 micron average droplets. Motors shall be installed with variable frequency drive (VFD) controls to provide soft-start, optimum operating speed and to minimize noise.

- C. Fog nozzles shall be 316 stainless steel, equipped with easily removed 5-micron polypropylene or Knar filter. Nozzles to be unconditionally guaranteed for a minimum 10 years against orifice wear.
- D. Nozzle manifolds and main piping shall be stainless steel tube (ASTM A269) capable of withstanding pressures up to 3,000 psi.
- E. Solenoid valves shall be designed to operate at pressures up to 3,000 psi, with anti-drip and unloading functions, Danfoss VDHT 15EC or approved equal.
- F. Provide insulation on all lines where condensation could form. Fog system control panel shall include:
  - 1. Provisions for manual and automatic operation
    - a. Hour meter
    - b. Pump dry-run shut off for low water pressure or inadequate water supply.
    - c. Provisions to automatically shut off the motor in the event of motor overloads, phase-loss, low voltage or short circuit.
    - d. Motor thermal protection.
    - e. 24 VAC interface for external controls.
    - f. Emergency stop.
- G. The high pressure fog system shall be designed as an evaporative cooling system to maintain 85 degree F air temperature at no more than 85% relative humidity within the greenhouse, based on an outside temperature of 92 degree F and relative humidity of 45%.
- H. The evaporative cooling system shall include all valves and other necessary controls to provide independent operation in each of the four zones of the greenhouse.
- I. High pressure fog equipment shall be installed in strict accordance with manufacturer's instructions.
- J. High pressure fog system shall be as manufactured and supplied by ColdFog or approved equal.

## 2.14 UNIT HEATERS

- A. Provide three (3) 202,000 Btu gas-fired unit heaters, including hangers and thermostat.
- B. Manufacturer: Modine, or approved equal.
- 2.15 HORIZONTAL AIR FLOW FANS
  - A. Provide four (4) horizontal air flow (HAF) fans. Fans shall have totally enclosed motors, minimum of 1,250 CFM capacity in free air.
  - B. Manufacturer: Schaffer VK12 or approved equal.
- 2.16 RETRACTABLE SHADE/HEAT RETENTION CURTAIN SYSTEMS
  - A. Provide independently operated curtain systems in each compartment, one horizontal and one vertical, at locations shown on drawings.
  - B. Curtain systems shall be sealed to minimize air transmission at edges using fixed fabric skirts. Fixed fabric panels shall be wrapped and stapled around 1x7 coated cable. Upper wrapped wire of sidewall seals to be capped with a smooth plastic wire guard to reduce wear between the shade/heat retention curtain and the seal. Wire guard shall travel the length of the greenhouse.
  - C. All curtains are to be precut with ends serged to prevent material from unraveling.

- D. Support curtains with clear, low friction polyester lines spaced 16 inches O.C.
- E. Prevent billowing with clear polyester lines on 32-inch centers.
- F. Shade/Heat retention fabric: Ludvig Svensson Tempa 5555 FR or approved equal.
- G. Curtain Drive motors to be U.L. or CSA approved, with integral primary and backup limit switches for each travel direction, Lock EWA series or approved equal.
- H. Drive cable: 3/32-inch diameter 7 x 19 stainless steel, continuous length with no splices.
- I. All rotating components such as brackets and pulleys shall have pre-greased double sealed ball bearings.
- J. All hardware shall be galvanized or plated to protect against corrosion.
- 2.17 LOW PRESSURE BENCH MOUNT IRRIGATION SYSTEM
  - A. The main line water supply system should maintain no greater than 50psi. If the existing system does maintain a higher pressure than 50psi supply and install a regulator (by others).
  - B. Install a riser system to provide full coverage on benches, complete with connectors, hangers, riser stands, polypipe and punch tool.
  - C. Each bench will be equipped with two <sup>3</sup>/<sub>4</sub>-inch single union ball valves. Greenhouse Contractor manufacturer will supply and install in each compartment a 1-inch cartridge filter 100 micron with 150 screen mesh that is rated for 25gpm.
  - D. Solenoid valves shall be fast acting, Globe type Body, cover to be nylon reinforced construction rated for 10-150 psi operating pressure (ANSI: Class 125) and stainless steel valve plunger and seats.
  - E. Nozzles will be alternating low pressure ADV at 3' on center
  - F. The water source and distribution piping to the solenoid valve for each compartment shall be provided by the plumbing contractor.

### 2.18 ENVIRONMENTAL CONTROLS

- A. The automated control system shall be the integrated product of a single manufacturer.
- B. The control system supplier shall provide all necessary equipment for a complete installation, including but not limited to all required sensors and signal conditioning equipment, relays, relay control panels, transformers and control software. Provide and mount a pre-wired NEMA contactor cabinet for control of all items noted in these specifications. The contactor panel shall control relays and/or magnetic contactors for control of the equipment. Control and power (line voltage and low voltage) wiring and conduit by electrical contractor.
- C. Electrical contractor to mount provided greenhouse environmental control panels at locations shown on drawings. Greenhouse Contractor to provide and installed 1/8-inch mill finished aluminum panel for any panels mounted to the greenhouse structure. Aluminum mounting panels to be fastened directly to structural posts. Control panel mounting location to be coordinated with greenhouse manufacturer.
- D. The control system shall be capable of remote operation and monitoring via a broadband connection.
- E. The environmental control system will include the capability of alerting supervisory personnel of alarm conditions via a phone connection and by text messaging and electronic mail via a broadband connection.
- F. The control system supplier will assume responsibility for ensure a complete and functional installation in accordance with these specifications and other construction documents.

- G. Automated environmental system will consist of Titan Controllers, Input/Output modules and contactor panels as manufactured and supplied by Argus Controls or approved equal. Manufacturer's personnel will supervise the installation and provide 8 hours of training.
- H. Environmental control system shall include complete control components for the following equipment and systems in each of the four zones:
  - 1. Modulating valve for overhead heating (Tri-State Floating).
    - a. Circulating pump for overhead heating (On/Off).
    - b. Reversing motor for thermal curtains (Tri-State Floating).
    - c. Reversing motor for vent windows (Tri-State Floating).
    - d. One control for Variable Frequency Drive controller for exhaust fan
    - e. Two solenoids for fog cooling (On/Off).
    - f. HAF fans (one circuit) (On/Off).
    - g. Two solenoids for misting/watering (On/Off)
    - h. Two lighting circuits (On/Off)
- I. The control system shall provide one (1) On/Off output for a single exhaust fan to remove air from above the shade curtains in all zones.
- J. The control system shall include the capacity for installation of a minimum of four additional On/Off digital outputs in each zone.
- K. The environmental control system shall be configured to monitor the following conditions in each of the four zones:
  - 1. Temperature at top of crop canopy
    - a. Temperature above shade curtains
      - 1) Relative humidity
      - 2) PAR
- L. The control system shall include the capacity to add a minimum of three additional sensors in each zone without the installation of additional input boards or control panels.
- M. The environmental control system shall include sensors and equipment to monitor the following within the greenhouse:
  - 1. Hot water main supply temperature
    - a. Hot water main return temperature
      - 1) Outside temperature
      - 2) Outside relative humidity
      - 3) Outside PAR
      - 4) Outside solar radiation
      - 5) Wind velocity
      - 6) A minimum of 4 additional environmental conditions without installing additional input boards or control panels.
- N. Sensor wiring is by the electrical contractor.
- O. The environmental control system shall be installed with complete controls for two fog pumps.
- P. The environmental control contractor shall supply and install relay control panels as required to provide a complete installation of all output devices listed in this section. All relays within the panel shall have 24VAC coils.
- Q. The environmental control system shall be capable of communication with the Building Automation System specified in Division 23 of these Specifications and should be installed

with all software and hardware necessary to provide environmental conditions and equipment status to the Building Automation System in real time.

- R. Sequence of operation:
  - 1. Daytime cooling: Provide proportional venting to attain the desired setpoint by opening the intake vent and activating the exhaust fan at the corresponding speed after a five second delay. The intake vent shall be opened to maintain a 750 fpm air velocity.
  - 2. Evaporative Cooling: Activate fog nozzles at the vent window when the exhaust fan is operating at full speed and the intake window is fully open and the greenhouse air temperature is above the setpoint. Activate fog nozzles within the greenhouse if the vent window nozzles have been operating for 10 minutes and the air temperature remains above the setpoint.
    - 3. Nighttime cooling: Provide proportional venting to maintain higher of the desired setpoint or a temperature 3oF above the outside temperature/para. Provide one hour ramp between daytime and nighttime settings.
  - 4. Overhead heating: Control unit heaters to achieve daytime and nighttime setpoints. Provide one hour ramp an hour before sunrise and an hour before sunset.
  - 5. Close shade curtains 15 minutes before sunset.
  - 6. Open shade curtains 5% 15 minutes after sunrise, wait 15 minutes, then open curtains 100%.
  - 7. Close curtains whenever the temperature is 3oF above the cooling setpoint and all stages of cooling are active and the outside light level is above 600 uE. Curtains shall remain closed for a minimum of 60 minutes.
  - 8. HAF Fans: Operate HAF Fans in the daytime when shade curtains are open.
  - 9. Activate attic exhaust fan when the temperature above the shade curtain in any of the four zones exceeds 90 degrees F.

## PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position
- B. Coordinate and furnish anchorages, setting diagrams, templates and directions for installation of anchorages.
- 3.02 GREENHOUSE ERECTION
  - A. Genertal: Comply with manufacturers' instructions, except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
  - B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing.
  - C. Set anchor bolts in accordance with approved engineered shop drawings.
  - D. Do not field cut or alter structural members without approval.
- 3.03 ENCLOSURE INSTALLATION
  - A. Install equipment in accordance with Manufacturer's installation instructions.
  - B. Secondary Structure: Install framing and glazing system for roof, exterior walls and interior partitions taking care to align members correctly for proper engagement of attachment system. Anchor framing securely in place with provisions for thermal and structural movement. The entire structure shall be constructed to prevent water incursion and air infiltration.

- C. Install gaskets, sealants, closures, and trim as the work progresses to minimize water and air infiltration into the completed installation.
- D. Provide supplemental framing for door openings. Anchor door frames securely and install flashing, trim, and sealants.
- 3.04 GLAZING PANELS
  - A. Handle and install panels in accordance with the manufacturer's instructions and recommendations.
  - B. Replace any damaged panels.
  - C. Install glazing panel system so it is watertight and to allow for thermal movement considerations.
- 3.05 GREENHOUSE EQUIPMENT
  - A. Install mechanical, electrical and other equipment specified in this section in accordance with manufacturer's recommendations.
- 3.06 ADJUSTING
  - A. Final Adjustments: Upon achieving substantial completion of the work, adjust operable components to ensure that they are properly installed and functioning smoothly. Replace any component which cannot be adjusted for proper operation.
- 3.07 DISSIMILAR MATERIALS
  - A. Separate aluminum from cementitious material with polyurethane or asphaltic coating.
- 3.08 GROUTING
  - A. After the wall sills have been placed, grout between the wall and the sill to eliminate any discrepancies between the two and produce a finished joint.
- 3.09 FLASHING
  - A. Provide counter-flashing as shown on approved greenhouse shop drawings. All flashing and counter-flashing shall be minimum 1/16-inch aluminum.
- 3.10 MANUFACTURERS FIELD SERVICES
  - A. Provide a minimum of (2) two site visits by Greenhouse Manufacturer during construction for project review and coordination.
- 3.11 DEMONSTION AND TRAINING
  - A. Greenhouse Manufacturer personnel, in combination with greenhouse environmental controls personnel, shall instruct Owner, on site, on the use and operation of the greenhouse, including greenhouse systems and equipment.
  - B. Greenhouse Contractor shall supply the project with complete sets of Operation & Maintenance manuals both in three ring binders (4) and in CD format. Maintenance manuals shall include all equipment data and product literature including all periodic maintenance requirements.
- 3.12 COORDINATION
  - A. All equipment, piping, conduit, and other devices and fittings shall be installed without interfering with any other greenhouse equipment or systems. Specifically, no installed materials shall obstruct doorways, vent windows, exhaust fan openings, thermal curtains or other greenhouse systems.

- 1. Equipment and other components of greenhouse shall be located and installed in a way that minimizes shading of the greenhouse interior.
- 2. High pressure fog nozzles shall be located and oriented so as to minimize the accumulation of spray drift on greenhouse components, equipment, fixtures and plants.

### 3.13 CLEANING

A. Upon completion, clean all surfaces which have become soiled or coated as a result of work of this section, using proper methods which will not scratch or otherwise damage finished surfaces. Use only products and techniques acceptable to manufacturer of products being cleaned.

### 3.14 TOLERANCES

- A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.
- B. Siding and Roofing: 1/8 inch from true position.

## **END OF SECTION**

## **SECTION 13 3416**

## OUTDOOR BLEACHERS AND GRANDSTANDS

### PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Provide outdoor permanent grandstands as described and shown on drawings and detailed in these performance specifications.

#### 1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 Cast-in-Place Concrete: Concrete Foundations.
- B. Division 26 Electrical: Main electrical feed and final hook-up to press box.
- C. Division 31 Earthwork: Surveying and site preparation.
- D. Division 32 Exterior Improvements: Landscape fabric and stone base under grandstands.

#### 1.03 DESIGN REQUIREMENTS

- A. New bleacher designs have been developed per recommendations by the district and no design changes are allowed. Contractor must verify that listed manufacturers are bidding on an equal basis as no design alterations or changes will be allowed for the bleachers or press boxes.
- B. Main Stadium Bleachers include:
  - 1. Base Bid- Seats (Per Plans)
    - a. 2,291 seat home side grandstand.
    - b. 36 foot wide steel framed sloped front one-tier press box and permanent steel canopy cover.
    - c. 770 seat visitor side stand .
- C. Baseball and Softball Fields:
  - 1. Provide (4) 100 seat portable bleacher units as shown.
- D. Alternate Bid:
  - 1. Provide additional quantities of 100 seat portable bleacher units. Refer to Division 1 Section Alternates.
- E. Provide necessary engineering, material, freight, concrete, installation, related site work, and supervision to provide grandstand seating systems listed below in accordance with the following performance specifications.
- F. The minimum acceptable standards of design are:
  - 1. Grandstand is elevated per plans. Front Walkway to be 6'-2" deep. Overall length per plans. Home stand permanent galvanized steel clear span I-Beam design, Visitor Side permanent galvanized steel leg truss System, athletic fields to be non-elevated angle frame bleacher units. Total net seating capacity with Handicap seating per plans.
  - 2. Rise/ Run per row Home Stand 10"/24" using fully closed interlock decking system, Visitor Stand 8"/24" fully closed tongue and groove decking system, athletic fields 8"/24" semi-closed tongue and groove decking system.
  - 3. Aisle layout is per plans. There shall be center aisle rails or end aisle rails per code.
  - 4. Handicap seating areas per plans with necessary closure panels.
  - 5. Finishes to be "hot dipped" galvanized on the steel understructure, clear anodized on the seat boards, High Performance Dur-Kyn paint on the aluminum aisle nosing strips at aisles and stairs, High Performance Dur-Kyn painted finish on aluminum stair risers and main grandstand risers. Perimeter Railing risers to be hot dipped galvanized, rails to be clear anodized and utilize 6 ga. black vinyl chain link fencing.

- 6. Walking Surfaces: Extruded to provide for spectator safety in wet conditions.
  - a. Walking surface traction (slip coefficient): ANSI B101.1 High Traction.
  - b. Walking surface: Extruded with repetitive serrations of ridges and valleys, shop blasted to achieve the high traction certified rating, with a clear anodized finish.
  - c. This entire process with the anodizing must meet the walking surface traction requirements of the ANSI and ADA codes.
- 7. The front and side closures where noted will be Dur-Kyn Ptd. Aluminum riser panels to provide closure from the walkway elevation to approx. 3" above grade. This closure is along the front of the bleacher and around the front and sides of front exits and side ramps per plans.
- 8. Seat Planks are anodized aluminum plank.
- G. Signage
  - 1. Identify handicap seating areas.
- H. Foundations have been designed for this project. Final approval drawings should provide a sealed set of documents inclusive of these designs
- I. Football Press Box: 8' deep by 36' wide, steel framed, sloped front press box with three internal rooms, internal ships ladder to filming platform and a steel framed roof canopy cover.
- J. Inspections/ Certificates:
  - 1. AISC plant certification of manufacturer is required.
  - 2. National floor safety institute or approved equal documentation for extra traffic coating as specified meeting high traction per ANSI B101.1
  - 3. Press boxes shall include ICC certified inspections for construction of electrical work. Data plate, certified sticker and back up documentation required.

## 1.04 RELATED REQUIREMENTS

- A. Section 03 3000 Cast-in-Place Concrete: Concrete Foundations.
- B. Division 26 Electrical: Main electrical feed and final hook-up to press box.
- C. Division 31 Earthwork: Surveying and site preparation.
- D. Division 32 Exterior Improvements: Landscape fabric and stone base under grandstands.

## 1.05 QUALITY ASSURANCE

- A. Manufacturers Qualifications:
  - 1. Manufacturers must have a minimum of ten years of experience in the manufacturing of grandstands and press boxes under current company name as a sole source provider.
  - 2. Manufacturer must provide five references (if requested) of similar projects completed in the last three years. References shall include scope of work, contract amount, owner's name and phone numbers, contract completion date and actual completion date.
  - 3. Manufacturer shall have local representation for the project. Representative is responsible to attend job site meetings, provide sequencing and scheduling information and make decisions on behalf of the manufacturer. Due to the coordination and timeframe of this project, it is imperative that this representative can immediately respond, in person, to evaluate questions, concerns and actions and resolve issues that immediately impact the fabrication and installation of the product or other contractors' abilities to proceed with their work.
- B. Welders must be AWS certified; manufacturing capabilities in accordance with the governmental agencies having jurisdiction.

- C. Steel fabrication to be done in an AISC certified plant or in compliance with IBC Chapter 17. A third party AISC approved inspection agency must be hired to complete and properly document these inspections. The agency must disclose any possible conflicts of interest so that objectivity can be confirmed. Certified reports shall be submitted directly to the architect for confirmation. All associated costs shall be inclusive with the manufacturers bid.
- D. Installers Qualifications:
  - 1. Factory-trained and experienced in the installation of grandstands.
- E. Source Quality Control: Mill Test Certification.
- F. Single Source Responsibility: Obtain all of each distinct material required from a single manufacturer.
- G. Code Compliance: Provide aluminum bleachers to meet or exceed all State and Local applicable codes and in compliance with the IBC/ICC National Code and CABO/ANSI A117.1 Barrier Free Subcode, Current Editions.

### 1.06 SUBMITTALS

- A. Product Data: Submit technical data for each distinct type of material, component and accessory indicated.
  - 1. Include information which specifically details physical properties and performance characteristics.
- B. Shop Drawings: Manufacturer to submit shop drawings and structural design calculations signed and sealed by a Delaware licensed Professional engineer, and schedules for type, location, quantity and details of all aluminum components required for this project.
  - 1. Indicate on shop drawings that products are in compliance with IBC/ICC National Building Code and all other State and Local Codes and Regulations.
  - 2. Concrete designed per American Concrete Institute Guidelines
- C. Samples: Submit manufacturer's samples for aluminum components, and an 18 inch seat sample.
- D. Certificate: Submit manufacturer's certification that materials furnished comply with requirements indicated and also in compliance with the IBC/ICC code and all other applicable Federal, State and local codes, and that materials meet or exceed test requirements indicated.

## 1.07 WARRANTY

A. Submit a written warranty signed by the manufacturer, installer, and the contractor, guaranteeing to correct failures for a period of two (2) years after substantial completion, without reducing or otherwise limiting any other rights to correction which owner may have under the contract documents. Failures are defined to include faulty workmanship or faulty materials. Correction may include repair or replacement.

## 1.08 BUILDING CODES

- A. Comply with all applicable codes, which include but are not limited to the following:
  - 1. IBC/ICC Building Code- Current Edition
  - 2. AISC Manual of Steel Construction, 9th Edition
  - 3. Aluminum Association of America Guidelines
  - 4. IBC barrier free sub-code and Guidelines
  - 5. U.S. Department of Justice ADA Standards
  - 6. American Concrete Institute

- B. The bleacher shall be designed to support, in addition to its own weight, a uniformly distributed live load of not less than 100 pounds per square foot of gross horizontal projection of the bleacher.
  - 1. Add 6 pounds per square foot of dead load on seats, footboards, risers and steel framing.
- C. All seat and footboard members shall be designed to support not less than 120 pounds per linear foot. The bleacher shall be designed to resist, with or without live load, horizontal wind load appropriate for local conditions. It shall also be designed to resist, in addition to the live load, sway forces applied to the seats in a direction parallel to the length of the seat planks 24 pounds per liner foot; and, in a direction perpendicular, stresses in aluminum members and connections shall not exceed those specified for Building Type Structures by the Aluminum Association.
- D. General: The structure shall be properly braced for wind and construction loads until all structural elements are secured. Lateral and longitudinal bays shall be cross-braced as required. Guardrails shall be of adequate size, location, and height to meet specified codes and designed to carry required loads. Exit stairs and intermediate aisle stairs shall be completely closed, in the direction of travel and shall have a maximum rise of 7 inches and a minimum tread of 11 inches.
- E. Code Compliance: Submittals shall be based upon specifications and drawings contained in the bid documents. Architect will not review any design or product changes prior to the bid date. Design changes to reduce overall aisle egress calculations or number of stair and ramp exits will not be allowed. Design changes to seatboard bracket support and location is not allowed. All bidders must bid in accordance with these specifications.
  - 1. The Bleacher Contractor shall be responsible to meet the code interpretation provided in the bid documents and modify as required by state or local governmental review boards.
  - 2. Calculations that demonstrate code compliance with egress and exit of aisles, stairs, and ramps are a required submission with approved drawings.

## PART 2 - PRODUCTS

## 2.01 MANUFACTURERS

- A. Basis of Design:
  - 1. Southern Bleacher Company; www.southernbleacher.com.
- B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.
- C. Other manufacturers include:
  - 1. Dant Clayton Corporation; www.stadiumbleachers.com.
  - 2. Outdoor Aluminum Inc.; www.outdooraluminum.com.
  - 3. E & D Speciality Stands, Inc.; www.edstands.com.
  - 4. Substitutions: See Section 01 6000.
- D. All manufacturers shall submit the following information to verify compliance for meeting the intent of these performance specifications.
  - 1. Provide a side by side comparison of all products specified including the press box per these performance specifications
  - 2. Provide documentation certifying that the all walking surfaces meet the criteria set forth in the specifications
  - 3. Provide proof of a minimum of 10 years manufacturing experience.

- 4. Provide a reference list with contacts for a minimum of 5 similar projects project site over the last 3 years.
- 5. Provide a sample drawing of press box to verify compliance with specified box.
- 6. Provide proof of AISC certified fabrication plant.
- 7. Provide proof of high performance coating systems per specifications along with samples.
- E. Sole source manufacturing: All products within this specification shall be manufactured by a sole source facility.
- F. Architect/Engineer/Owner reserves the right to accept or reject Grandstand manufacturers. All approvals will be in writing through addendum prior to the bid date.

## 2.02 PERMANENT STEEL GRANDSTAND

- A. Description Home and Visitor side premium interlock decking system
  - 1. The intent of the product design is to reduce deflection of aluminum deck and to eliminate fluid drainage below spectator seating.
  - 2. All individual deck members shall be locked together longitudinally at all treads, front walk and cross walk locations.
  - 3. Design shall allow for expansion and contraction without damage or deformation of the aluminum deck.
  - 4. The locking design does not allow any fluids to pass to the ground under the Spectator seating.
  - 5. Extrusion gutters are part of each decking member that will allow for the collection and control of fluids that occur on the deck surface.
  - 6. At all butt joint locations, internal gutters shall be mounted onto the structural members to direct fluids to determined locations.
  - 7. Vertical columns are to be placed 6 feet 0 inches on center laterally and front to back per plans.
  - 8. Traverse bays are free of cross bracing the total length of the grandstand.
  - 9. Stringers: wide flange with steel angle rise and depth fabrication and are placed 6 feet on center.
  - 10. Front Walkway: per plans
- B. Entry stairs to be firmly anchored to uniformly poured concrete bases.
  - 1. Stair rise: max. (7) inches per IBC Building Code with aluminum closure.
  - 2. Stair tread depth: min. (11) inches per IBC Building Code.
  - 3. Guardrails on Stair to be (42) inches above leading edge of step with intermediate rails.
  - 4. Stairs to have handrail extension. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgripportion of handrails shall have a smooth surface with no sharp corner. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the nosing of treads and landings. Handrails shall be continuous the full length of the stairs and shall extend in the direction of the stair run not less than 12 inches beyond the bottom riser. Ends shall be returned or shall terminate in newel posts or safety terminals.
- C. Aisles:
  - 1. Aisles with seating on both sides to have 34-inch high handrail with intermediate rail at approximately 22 inches above tread.
  - 2. Anodized aluminum handrails with rounded ends (no fittings) are discontinuous to allow access to seating through a space 22 inches (min.) to 36 inches (max.).

- 3. Intermediate steps shall provide equal rise and run throughout aisle. Each all have aisle nosing and closure with Dur-Kyn finish.
- D. Interlock Deck System:
  - 1. Rise and depth at each row is per plans
  - 2. Each seat 17 inches above its respective tread.
  - 3. Decking Arrangement:
    - a. The seats shall be 2"x10" seat plank with two internal legs and extruded aluminum alloy, 6063-T6 with clear anodized 204R1, AA 10C22A31, Class II finish. Mounting brackets to be "L" type riser mounted (home and visitor stands).
    - b. The tread system shall be comprised of uniform serrated, slip resistant aluminum interlock together lengthwise and form a .922" x .60" V-shaped gutter running the length of the planks. The interlocking mechanism will minimize deflection and not separate due to loads being applied to individual planks. The locking mechanism by design shall allow for expansion and contraction of individual planks without affecting performance of the system.
    - c. The system shall cause the deck planks to react together at all treads and cross walks to live load and form the appearance of a single tread system. By design, this system forms a solid, overlapping tread and riser installation.
    - d. The nose extrusion shall allow for a 1" extruded aluminum contrasting nose piece to be flush mounted on the leading edge and shall capture the vertical riser plank in an extruded pocket. The extrusion shall have a .70" vertical lip at the rear of the plank to allow for placement of vertical riser plank and inhibit fluids from escaping at the rear of the tread.
    - e. These extrusions shall be such that the attachment of the seat brackets, step brackets, mid-aisle rails and all other components is accomplished without deck penetrations. No through bolting or drilling of the aluminum tread / riser system shall be permitted.
    - f. The system shall allow for seat and aisle reconfiguration at any time without evidence of its previous configuration.
    - g. Entry stairs and ramps to be 2 x 12 mill finish aluminum.
    - h. Open ends of planks to be covered with aluminum end caps, securely fastened to the plank.
    - i. Joint sleeves: Dual joint sleeves to be inserted at each butt joint of each load bearing aluminum plank, and to penetrate 6 inches into each plank at the joint. Joint sleeves are not required at secondary gutter locations.
- E. Guards: Guards shall be provided at all sides of bleacher, entry stairs, ramps portals and landings.
  - 1. Vertical rail risers to be galvanized steel angle 3" x 3" x <sup>1</sup>/<sub>4</sub> (50 ksi) for steel to steel connection and fastened with 3/8" galvanized hardware.
  - 2. Horizontal railing to be anodized aluminum with aluminum cast end plugs at ends of straight runs and/or elbows at corners.
  - 3. All guards shall be secured to vertical rail members with hot dipped galvanized fasteners and clamps.
  - 4. Railings shall be placed at a minimum of 42" above walkways, entrances and adjacent seat boards.
  - 5. The barrier material shall include 6-gauge black vinyl coated chain link fencing, fastened in place with hot dipped galvanized tension bars and aluminum ties.
- F. Ramps:

- 1. Slope: 1 in 12.
- 2. Guardrails to be 42 inches above ramp with two-line anodized aluminum rail and in filled with 6-gauge black vinyl coated chain link fence (2" mesh) and 2 x 6 extruded aluminum toe board.
- 3. Handrail: Ramps to have handrail extensions. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the ramp surface. Handrails shall be continuous the full length of the ramp and shall extend in the direction of the ramp not less than 12 inches beyond the end of the ramp. Ends shall be returned or shall terminate in newel posts or safety terminals. If returned, rail must be smooth with no external fittings.
- 4. Termination: Ramps shall end with smooth transition onto level concrete pad at benchmark elevation. Aluminum plate with end closures required.
- G. Handicap provision:
  - 1. Quantity of wheelchair spaces: as shown on drawings and in full compliance with Barrier Free Standards set forth in the International Building Code.
  - 2. Riser area adjacent to wheelchair spaces to have intermediate construction so 4 inch sphere cannot pass through opening.
  - 3. Guardrail: Area directly behind handicap areas shall have two line anodized aluminum rail attached to the surface of the decking / riser members. These rails shall be pre-fabricated to match the appearance of the mid-aisle handrails. A toe rail shall be attached to the base of the rail.
- H. Substructures:
  - 1. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
  - 2. Shop connections are seal welds.
  - 3. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications. Painted and/or powder coated steel does not offer proper protection and is not an acceptable protective finish for this project
  - 4. All hardware shall be hot-dipped galvanized to ASTM A-123, mechanically galvanized or aluminum (aluminum applies to pop rivets, drive rivets, wire ties).
  - 5. A minimum of 3/8" galvanized connection hardware to be used on the substructure
- I. Extruded Aluminum:
  - 1. Seat Planks and Railing are extruded aluminum alloy, 6063-T6 with clear anodized 204R1, AA-M10C22A31, Class II finish.
  - 2. Riser planks are extruded aluminum alloy, 6063-T6 with Dur-Kyn high performance painted finish.
  - 3. Tread, stair and ramp planks are extruded aluminum alloy 6063-T6 mill finish
  - 4. Joint Sleeve Assembly to be inserted in flat plank to maintain true alignment in joining together two plank pieces. Extruded aluminum alloy, 6063-T, mill finish.
- J. Accessories:
  - 1. Channel End Caps: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II. Mechanically fastened.
  - 2. Cast End Plugs: Aluminum 319 alloy, cast finish. (Required at termination ends of railing)
  - 3. Hardware:

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- a. Bolts, Nuts: Hot-dipped galvanized or mechanically galvanized.
- b. Hold-down Clip Assembly: Aluminum alloy 6005A-T6, mill finish.
- c. Structural Hardware: Equal to or greater than hot dipped galvanized ASTM-A307. No connections utilizing high strength bolts are classed as slip critical.
- 4. Aisle Nose and Stair Nose: Aluminum alloy, 6063-T6, slip-resistant black painted finish. Mechanically fastened.
- K. Design Load:
  - 1. Live Load: 100 psf gross horizontal projection.
  - 2. Lateral Sway Load: 24 plf seat plank.
  - 3. Perpendicular Sway Load: 10 plf seat plank.
  - 4. Live Load of Seat and Tread Planks: 120 plf.
  - 5. Handrails and Guardrail: Per IBC Building Code.
  - 6. Wind load: Per IBC Building Code.
  - 7. Live load deflection of structural members shall be limited to L/200 of the span.
- L. All manufactured connections to be shop welded.
  - 1. Manufactured by certified welders conforming to AWS Standards.

2.03 PRESS BOX WITH STEEL FRAME STRUCTURE

- A. Description: Press box design criteria must be met as listed and specified. Manufacturer's standard boxes if they do not meet these criteria, will not be acceptable
- B. Press box Dimensions: (8) feet wide x (36) feet long sloped front design
- C. Press box to be of open construction, allowing inspection of electrical wiring, switches and other components without destructive disassembly.
- D. Press box to be constructed with interior ships ladder access to filming platform.
- E. Press box end viewing glass window design is required
- F. Press Box Support Structure:
  - 1. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
  - 2. Shop connections are seal welds.
  - 3. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.
- G. Press Box: All materials shall be new and shall comply with ASTM specifications.
  - 1. Floor
    - a. Main support to be a galvanized steel floor frame sized to support structure and metal belly pan for support of insulation.
    - b. Floor to be INTERLOCK Aluminum Decking System, extruded aluminum alloy 6063-T6. Attach Decking System to steel floor frame with mechanical fasteners at end of plank and at intermediate supports. Wood/plywood base decking has proven to deteriorate over time and is not an acceptable alternative.
    - c. Insulation: Kraft faced fiberglass building insulation R-11, 3 1/2 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglass Corp., or equal.
    - d. Wall Structure Steel Framing
      - 4 inch x 4 inch x 11 gauge square tubing with maximum span of 14 feet on front wall and maximum span of 6 feet on back wall and 4 inch x 2 1/2 inch x 14 gauge steel "cees" with maximum spacing of 5 feet for all walls with siding. Spans greater than these require engineered calculations for design.
      - 2) Insulation: Kraft faced fiberglass building insulation R-11, 3 <sup>1</sup>/<sub>2</sub> inches thick. Batt or roll as manufactured by Owens-Corning Fiberglass Corp., or equal.

- 3) Interior Finish
  - (a) 1/2 inch vinyl coated gypsum panels, Gold Bond vinyl-surfaced
  - (b) Cove Base: Vinyl 4 inches x.080 color to be medium gray.
- 4) Exterior Finish
  - (a) 26-gauge prefinished R-Panel paneling as manufactured by MBCI, Signature 200 color series, color to be determined. Vinyl clad siding is not an acceptable product.
  - (b) Wall panels are attached with #12 TEK screws 6" O.C. at the top and bottom of the panels. Lap screws are placed at each end of the panels, at the intermediate supports, and at the midpoint between supports (TEK #14). All fasteners to be painted same color as exterior paneling.
- e. Roof Structure
  - 4 inch x 4 inch x 11 gauge square tubing with maximum spacing of 6 feet on center and 4 inches x 2 1/2 inches x 14 gauge steel "cees" with maximum spacing of 2 feet on center.
  - 2) Roof: 1/8 inch four way steel plate roof, continuous welded seams coated with acrylic metal primer as manufactured by Coronado and 36 mils of acrylink roof coating as manufactured by Isothermal Protective Coatings, or equal. Plate is welded on both sides of rafters with 1-1/2 inch long 1/8 inch fillet welds on 12 inch centers. Plywood sheathing will not be accepted.
  - 3) Insulation: Kraft faced fiberglass building insulation, R-19 (minimum) 6 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglas Corp., or equal.
  - 4) Cornice: 26-gauge steel prefinished- color to be determined.
  - 5) Ceiling: 24 inch x 24 inch x 5/8 inch acoustical ceiling tile architectural revealed edge style wind clips and other components as manufactured by USG, or equal.
- f. Exterior Doors
  - Full flush steel construction with honeycomb core. 18-gauge skin sheets. Dimensions: 3 feet 0 inches x 6 feet 8 inches. Color: White.
  - 2) Steel door frame (16 gauge) complete with 1/2 inch threshold and weather-stripping.
  - 3) Exterior Hardware (Prior to completed fabrication check with the district to verify what core lock system they use): Yale 546F Exterior Trim, or equal. Handles shall be lever type that allows operation without tight grasping or twisting of the wrist. All exterior hardware must accommodate this.
  - 4) Interior Hardware: Yale 2100 Exit Device, or equal. Handle shall be panic bar that allows for opening without any grasping, twisting or turning.
  - 5) Interior Walls
    - (a) Framing to be steel galvanized studs (25 gauge) 1 1/4 inch x 3 5/8 inch at maximum 2 feet on center.
    - (b) Finishes to be consistent with all other interior finishes.
    - (c) A 24" x 56" interior window in each wall.
- g. Windows
  - 1) Frame: Extruded aluminum single hung, horizontal sliding unit, thermal break.
  - 2) Sash: Tilt toward inside for easy cleaning.
  - 3) Glazing: Clear tempered panes.

- 4) Dimensions of each unit: Dependent on compartment size. At interior wall locations or structural support locations the dimension between windows shall be no greater than 6 inches.
- 5) Finish: Electrostatically applied acrylic enamel.
- h. Work Bench

1)

- 1) 18 inch deep clear anodized aluminum countertop with a radius front edge.
- 2) Support using 4" x 2" x 14 ga. Steel "cee" on 4" x 4" x 11 ga. Sq. tubing welded to steel.
- 3) Shelf brackets do not provide proper support and are not acceptable.
- i. Painting: Materials equal to. Coronado or equal.
  - Surfaces: Exterior Door(s), Door Frame(s)
    - (a) Primer: Applied by Door Manufacturer.
    - (b) Finish: 2 coats acrylic latex semi-gloss enamel applied by press box manufacturer.
  - 2) Surfaces, Exterior Siding
    - (a) Primer: by siding manufacturer.
    - (b) Finish: Factory finish by siding manufacturer.
    - (c) Touchup: If applicable
  - 3) Surfaces: Wall and Roof Structure
    - (a) Primer: Coronado DTM Industrial 180-11 acrylic metal primer applied after welding, or equal.
- j. Sealant: Sonneborn NP1 Polyurethane sealant, All temperature, UV resistant, or equal.
- k. Electrical Work:
  - 1) Submittal drawing shall indicate devices and circuitry.
  - 2) Fixtures: Recessed Edgelit LED panel light fixture for use in grid ceiling systems.
  - 3) Wiring to be in nonmetallic Panduit, or equal. N.E.C. breaker box to be 100 amp service mounted on wall with 2 inch rigid conduit to be stubbed out at back wall of press box ready for service line to be connected.
  - 4) Service line to Press Box (By Electrical Contractor)
  - 5) Electrical outlet(s) installed per NEC shall be standard duty.(a) All outlets shall be surface mounted on wall.
  - 6) Sound, Telephone, Clock, Field Communication: Empty double outlet boxes per N.E.C. with 3/4 inch conduit stubbed out bottom of Press Box. Electrical contractor is responsible for re-connecting all electric, telecommunications and audio/ visual wiring, conduit and equipment to the press box.
  - 7) Outlet boxes to be flush mounted into wall. Any wiring completed on-site will be responsibility of such contractor for inspections. Quantity per plans.
  - 8) Filming Area/Observation Deck: Weathertight outlet box for cameras. Quantity: Two. Owner shall indicate additional outlets needed.
  - 9) Provide base board heat in each room sufficient for the square footage
  - 10) Provide in each room an emergency combination exit/flood light with battery back-up. Also provide two exterior emergency lights with remote heads.
  - 11) Provide (2) wall mount exterior lights with photocell
  - Provide fire extinguishers at each exit door (2) total.
- 2. Filming Area/Observation Deck
  - a. Access

1.

- 1) Interior ships ladder to filming platform
- b. Roof guard railing to be 48" above walking surface around perimeter of deck attached to 5/8 inch galvanized studs to be welded to roof support structure. The guard railing to be 6 gauge black vinyl fencing.

## PART 3 - EXECUTION

## 3.01 INSTALLATION

- A. All work performed by technicians experienced in bleacher seating. Project references may be required to verify the quality of finished projects.
  - 1. Installation with proven experience in the Mid-Atlantic region. Requirement for a minimum of (3) installer references in DE for this project of similar size and scope.
- B. Project is only to be installed as per approved shop drawings.

## 3.02 FIELD QUALITY CONTROL

- A. Foundation: Footings for the grandstand shall provide sufficient bearing area at bottom to support all loads of the grandstand. Depth and design of footings have been designed for this project and shall be bid in accordance with the plans and specifications. Hot-dipped galvanized anchor bolts shall be secured in the concrete footings.
  - 1. Concrete shall attain working strength of 4,000 psi.
- 3.03 EXAMINATION
  - A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

## 3.04 ERECTION

- A. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- B. Set column base plates with non-shrink grout to achieve full plate bearing.
- C. Do not field cut or alter structural members without approval.
- D. After erection, prime welds, abrasions, and surfaces not shop primed.

## 3.05 CLEAN-UP

- A. Clean up all debris caused by work of this section removed from site.
- B. Upon completion of the work and final inspections, bleacher manufacturer shall broom clean the stand removing all loose debris.
- C. If broom cleaning does not properly remove dirt and debris from the surface, pressure washing will be required.

## END OF SECTION

# SECTION 14 4500 VEHICLE LIFTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Vehicle lifts including safety equipment, controls and accessories.
- 1.02 RELATED SECTIONS
  - A. Division 22 Basic Mechanical Materials and Methods: Hydraulic lines, fittings, and related accessories.
  - B. Division 26 Basic Electrical Materials and Methods: Service, circuiting, wiring, and connections for power and controls.

### 1.03 REFERENCES

- A. ALI: Automotive Lift Institute.
- B. ANSI/ALI ALCTV: Safety Requirements for the Construction, Testing, and Validation of Automotive Lifts.
- C. UL201: These requirements cover garage equipment, rated not more than 600 volts, for use in accordance with the National Electrical Code, NFPA 70.

#### 1.04 SUBMITTALS

- A. Submit under provisions of Section 013000.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation manual.
  - 4. Operations manual.
  - 5. Maintenance manual.
  - 6. Safety manual.
- C. Shop Drawings: Template drawings and load reactions for lift application.

#### 1.05 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Factory trained authorized company.
  - 2. Company insured for completed operations of installing lift.
- B. In addition to the other requirements outlined herein, the lift or lifts, shall comply with all applicable requirements of ANSI standards. "Safety Requirements for the Construction, Care and Use of Automotive Lifts " as published by the American national Standards Institute. The lift company Quality Management System shall be ISO9001 certified.

#### 1.06 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- 1.07 WARRANTY
  - A. Contractor/manufacturer/installer has responsibility for an extended Corrective Period for work of this Section for the period stated from date of Substantial Completion against deficiencies as stated in the manufacturer's standard warranty.

- B. Contractor/manufacturer/installer shall promptly and without inconvenience and cost to Owner correct said deficiencies:
  - 1. Failure due to defective materials and workmanship.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Acceptable Manufacturer:
  - 1. Rotary Lift; www.rotarylift.com
  - 2. Mohawk Lifts; www.mohawklifts.com.
- B. Substitutions: will be considered under the provisions of Section 01 6000.

### 2.02 TWO-POST VEHICLE LIFTS

- A. Capacity: 15,000 lb.
- B. Product:
  - 1. Rotary Lift: SPO15
  - 2. Mohawk Lift: TP-16
- C. Minimum Bay Requirements:
  - 1. Floor space 12 feet x 26 feet (3657mm x 7925 mm).
  - 2. Floor slab concrete 3000 psi 5-1/2 inch 6 inch. (138mm 152 mm).
- D. Width Inside Columns: 120 inch (2880 mm).
- E. Overall Width: 12'-11 inches
- F. Drive Through Clearance At Tires: 102-3/8 inches (2600 mm).
- G. Lift shall be 3rd party certified by ETL testing laboratory and labeled with the ETL/Automotive Lift Institute (ALI) label that affirms the lifts meet conformance to all applicable provisions of American National Standard ANSI/ALI ALCTV.
- H. Electrical: 208v, single phase, 2 HP.

## PART 3 EXECUTION

- 3.01 EXAMINATION
  - A. Do not begin installation until supporting structures have been properly prepared.
  - B. If supporting structure preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- 3.02 INSTALLATION
  - A. Install in accordance with manufacturer instructions.
- 3.03 PROTECTION
  - A. Protect installed products until completion of project.
  - B. Touch-up, repair or replace damaged products before Substantial Completion.

## **END OF SECTION**