

Gonzales Community Center Complex

PART 2A - CRITERIA DOCUMENTS

Technical Specifications

Volume 1 of 3

100% DESIGN CRITERIA DOCUMENTS

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SECTION 03 20 00 - CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.

1.2 RELATED REQUIREMENTS

- A. Section 03 10 00 - Concrete Forms and Accessories.
- B. Section 03 30 00 - Cast-in-Place Concrete.
- C. Section 04 82 00 - Reinforced Unit Masonry Assemblies: Reinforcement for engineered masonry.

1.3 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2016.
- B. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2014.
- C. ACI SP-66 - ACI Detailing Manual; American Concrete Institute International; 2015.
- D. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2017.
- E. ASTM A 706/A 706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2017.
- F. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; American Welding Society; 2011.
- G. CRSI (DA4) - Manual of Standard Practice; Concrete Reinforcing Steel Institute; 2001.
- H. CRSI (P1) - Placing Reinforcing Bars; Concrete Reinforcing Steel Institute; Eighth Edition.

1.4 SUBMITTALS

- A. See Division 01 for-Construction Waste Management and Disposal, Sustainable Design Requirement, and Submittal Procedures for required submittals.
- B. Shop Drawings: Comply with requirements of ACI SP-66-15. Include bar sizes and material types, lengths, spacings and locations, and quantities of reinforcing steel; bar schedules, stirrup spacing, shapes of bent bars, spacing of bars, and types and location of splices. Include special reinforcement required at openings and flat slab shear reinforcing. Do not reproduce construction documents for shop drawings.
- C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

- D. Product Data: Submit for bar supports, chairs, rebar couplers, and flat slab shear reinforcing.
- E. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Store reinforcement in a manner that shall prevent rusting or coating with grease, oil, dirt, and other objectionable materials.
- B. Deliver reinforcement to the job site bundled, tagged and marked, using metal tags.

1.6 QUALITY ASSURANCE

- A. Perform work of this section in accordance with CRSI (DA4), CRSI (P1), ACI 301-16, ACI SP-66-15, and ACI 318-14 in addition to applicable building code.
 - 1. Maintain one copy of each document on project site.
- B. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.

PART 2 – PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420) for #7 and smaller bars.
 - 1. Deformed billet-steel bars.
 - 2. Unfinished.
- B. Reinforcing Steel: ASTM A 706/A 706M, Grade 60 (420) for #8 and larger bars and all bars to be welded. Permitted for bars #7 and smaller.
 - 1. Deformed low-alloy steel bars
 - 2. Unfinished.

2.2 REINFORCEMENT ACCESSORIES:

- A. Tie Wire: Annealed, minimum 16 gage (1.5 mm).
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
- C. Bar Supports placed against ground: Precast concrete blocks not less than 3 inches square with embedded wires.
- D. Mechanical Couplers:
 - 1. Manufacturers:
 - a. Headed Reinforcement Corporation (HRC); Product: Xtender: www.hrc-usa.com
 - b. Erico; Product: Threaded or Interlock Coupler: www.erico.com
 - c. Erico; Product: CADWELD: www.erico.com
- E. T-Headed Reinforcement:
 - 1. Manufacturers:

- a. Headed Reinforcement Corporation (HRC); Product: 00 or 200 Series:
www.hrc-usa.com
- b. Headed Reinforcement Corporation (HRC); Product: Xtender 500 Series Round
or Rectangular: www.hrc-usa.com
- c. Erico; Product: Terminator: www.erico.com

2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice, ACI SP-66-15 - ACI Detailing Manual, ACI 318-14, and ACI 301-16.
- B. Welding of reinforcement is permitted only where indicated on drawings. Perform welding in accordance with AWS D1.4.
- C. Mechanical couplers may be substituted for contact lap splices as permitted on drawings.
- D. Locate reinforcing splices not indicated on drawings at point of minimum stress.
 1. Stagger splice locations so that no more than 50% of the bars are spliced at a section.
 2. Locations of splices subject to approval by Architect.

2.4 SOURCE QUALITY CONTROL

- A. The City's testing agency shall perform source quality control review, as specified in Division 1.
- B. Review mill test reports containing tensile and bend tests for type and grade of reinforcing steel.

PART 3 – EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position by more than the tolerances set forth in ACI 301-16.
- B. Do not displace or damage vapor barrier and water proofing membrane.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcing as indicated on drawings.
- E. Conform to applicable code for concrete cover over reinforcement.
- F. Clean reinforcement of loose rust and mill scale, oil, grease, earth, ice, and other materials which reduce or destroy bond with concrete.
- G. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- H. Welding:
 1. Welding shall not be done on or within two bar diameters of any bent portion of a bar which has been bent cold.
 2. Welding of crossing bars is not permitted.
 3. Protect adjacent reinforcement against arc strikes during welding.
- I. Do not bend or realign reinforcement after being embedded in hardened concrete.

3.2 FIELD QUALITY CONTROL

- A. The City's testing agency, as specified in Division 1, shall inspect installed reinforcement for conformance to contract documents before concrete placement.
- B. Visually Inspect 100 percent of mechanical coupler installations.
- C. Inspect placement, location, splices, spacing, size, cover and type of reinforcement for conformance with the contract documents.
- D. Visually inspect placement of flat slab shear reinforcing for conformance with the contract documents and manufacturer recommendations.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Concrete for composite floor construction.
- B. Elevated concrete slabs.
- C. Floors and slabs on grade.
- D. Concrete foundations.
- E. Miscellaneous concrete elements, including equipment pads and curbs.
- F. Concrete curing.

1.2 RELATED REQUIREMENTS

- A. Section 03 10 00 - Concrete Forms and Accessories: Forms and accessories for formwork.
- B. Section 03 20 00 - Concrete Reinforcement.

1.3 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).
- B. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Light Weight Concrete; American Concrete Institute International; 1998.
- C. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2016.
- D. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2015.
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
- F. ACI 304.2R - Placing Concrete by Pumping Methods; 1996
- G. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 2010.
- H. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2011.
- I. ACI 309 - Standard Practice for Consolidation for Concrete; 2005.
- J. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2014.
- K. ASTM C 31 - Standard Method of Making and Curing Concrete Test Specimens in the Field. 2016
- L. ASTM C 33 - Standard Specification for Concrete Aggregates; 2016.

- M. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2016.
- N. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete; 2016.
- O. ASTM C 143/C 143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2016a.
- P. ASTM C 150 - Standard Specification for Portland Cement; 2016.
- Q. ASTM C 157/C 157M - Standard Test Method for Length Change of Hardened Hydraulic-Cement, Mortar, and Concrete; 2016.
- R. ASTM C 171 - Standard Specification for Sheet Materials for Curing Concrete; 2016.
- S. ASTM C 173/C 173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.
- T. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2016.
- U. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2016
- V. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete; 2016.
- W. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2016.
- X. ASTM C 685/C 685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2016
- Y. ASTM C 1107/C 1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2016.
- Z. ASTM C 1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2016.
- AA. ASTM E 1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers; 1996 (Reapproved 2008).

1.4 SUBMITTALS

- A. See Division 01 for-Construction Waste Management and Disposal, Sustainable Design Requirement, and Submittal Procedures for required submittals.
- B. Product Data: Submit manufacturer's data on manufactured products, curing material, slab treatments, evaporation reducing compound and joint fillers showing compliance with specified requirements.
- C. Samples: Submit as required by City's Testing Agency or Architect.
- D. Certified mix design: Submit for each type and strength of concrete, at least 4 weeks prior to placement.

1. Include results of testing or test data used to establish mix proportions in accordance with ACI 318-14. This is to include unit weight, slump, shrinkage, and compression test reports. Mix designs to be prepared, stamped and signed by a Professional Engineer registered in the State of California.
- E. Certificates of Compliance:
 1. Cement.
 2. Aggregates.
 3. Admixtures.
 4. Color Pigments.
- F. Proposed construction joint locations.
- G. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction for concrete accessories.
- H. LEED Submittals: If wood form materials, including supports, are used, submit relevant LEED Submittal Forms showing content of sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, and locally-sourced wood, as specified in Section 01 35 05.
- I. Local/Regional Materials:
 1. Sourcing locations: Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
 2. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
 3. Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
 4. Product Component(s) Value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.

1.5 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301-16 and ACI 318-14.
 1. Maintain one copy of each document on site.
- B. Manufacturer Qualifications:
 1. A firm experienced in manufacturing ready mixed concrete products complying with ASTM C 94 and requirements for production facilities and equipment.
 2. Manufacturer to be certified according to the National Ready Mixed Concrete Association certification for ready mixed concrete production facilities.
- C. Placement and Finishing sub-contractor to have a minimum of five year's experience with similar types of projects.
- D. Follow recommendations of ACI 305R-10 when concreting during hot weather.

PART 2 – PRODUCTS

2.1 FORMWORK

- A. Comply with requirements of Section 03 10 00.

2.2 REINFORCEMENT

- A. Comply with requirements of Section 03 20 00.

2.3 CONCRETE MATERIALS

- A. Cement: ASTM C 150, Type I - Normal or Type II - Moderate Portland type.
 - 1. Acquire all cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C 33. Cleanliness not to be less than 75 when tested in accordance with California Test 217 for Fine Aggregates or California Test 227 for Coarse Aggregates.
 - 1. Acquire all aggregates for entire project from same source.
- C. Fly Ash: ASTM C 618, Class F.
- D. Calcined Pozzolan: ASTM C 618, Class N.
- E. Silica Fume: ASTM C 1240, proportioned in accordance with ACI 211.1.
- F. Slag Cement: ASTM C989, Grade 120.
- G. Water: Clean and not detrimental to concrete.

2.4 CHEMICAL ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Admixtures to be compatible with all other components in the mix.
- C. Admixtures are to be included in the mix used to establish the mix design.
- D. Air Entrainment Admixture: ASTM C 260.
- E. High Range Water Reducing and Retarding Admixture: ASTM C 494/C 494M Type G.
- F. High Range Water Reducing Admixture: ASTM C 494/C 494M Type F.
- G. Water Reducing and Accelerating Admixture: ASTM C 494/C 494M Type E.
- H. Water Reducing and Retarding Admixture: ASTM C 494/C 494M Type D.
- I. Accelerating Admixture: ASTM C 494/C 494M Type C.
- J. Retarding Admixture: ASTM C 494/C 494M Type B.
- K. Water Reducing Admixture: ASTM C 494/C 494M Type A.
- L. Shrinkage Reducing Admixture: ASTM C 494/C 494M, ASTM C 157
 - 1. Acceptable Products:
 - a. Eclipse; Grace Construction Products: www.na.graceconstruction.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.5 ACCESSORY MATERIALS

- A. Underslab Vapor Barrier: See Section 07 26 00 - Below Grade Vapor Retarder.
- B. Rock Base:

1. Interior slabs-on-grade: Free draining, clean crushed rock or gravel conforming to Caltrans Class 1, Type A permeable material
- C. Chemical Hardener: Fluosilicate solution designed for densification of cured concrete slabs.
- D. Non-Shrink Grout: ASTM C 1107 Grade B; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 1. Minimum Compressive Strength at 48 Hours: 2,400 psi (17 MPa).
 2. Minimum Compressive Strength at 28 Calendar Days: 7,000 psi (48 MPa).
 3. Acceptable Products:
 - a. Masterflow 713 Plus; Degussa Building Systems: www.chemrex.com.
 - b. Five Star Grout; Five Star Products, Inc.: www.fivestarprouducts.com.
 - c. NS Grout; Euclid Chemical Company: www.euclidchemical.com.
 - d. Substitutions: See Section 01600 - Product Requirements.
- E. Moisture-Retaining Cover: ASTM C 171; white burlap-polyethylene sheet.
- F. Liquid Curing Compound: ASTM C 309, Type 1, clear or translucent.
 1. For surfaces to be finished or which will be exposed to view, confirm that the curing compound is compatible with and not detrimental to finishes.
 2. Color changes to be approved by the Architect.

2.6 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1-02 recommendations.
 1. Use admixtures as necessary to produce concrete of a consistency that shall allow thorough compaction of the concrete into corners and around reinforcing without excessive puddling, spading or vibration, and without permitting the materials to segregate or free water to collect on the surface. Produce dense and uniform concrete free from rock pockets, honeycomb and other irregularities.
 2. Contractor to review and approve the proposed concrete mix designs for compatibility with placing requirements to insure that the concrete as designed can be placed in accordance with the Drawings and Specifications.
- B. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2-98 recommendations.
- C. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301-16. Mix design to be prepared by a licensed Professional Engineer.
 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- E. Cements and aggregates to have a proven history of successful use together. Alternatively submit evidence satisfactory to Architect that aggregate will not react harmfully in presence of alkalis in cement.
- F. Normal Weight Concrete:

1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 calendar days for above grade concrete or 56 calendar days for footing and grade beam concrete: As indicated on drawings.
 2. Fly Ash Content: Minimum 25 percent and maximum 35 percent of cementitious materials by weight, except at footings and grade beams where 50 percent minimum is required.
 3. Calcined Pozzolan Content: Maximum 20 percent of cementitious materials by weight.
 4. Silica Fume Content: Maximum 5 percent of cementitious materials by weight.
 5. Water-Cement Ratio: Maximum 45 percent by weight.
 6. Dry Unit Weight: Minimum 144 lbs per cubic foot and maximum of 150 lbs per cubic foot.
 7. Total Air Content: 6 percent maximum, determined in accordance with ASTM C 173/C 173M.
 8. Admixtures: High Range Water Reducer at Contractor's option.
 9. Maximum Slump at point of placement: 4 inches (100 mm).
 - a. Maximum Slump with Water Reducing Admixture: 8 inches (200 mm).
 10. Minimum Slump at point of placement: 1 inch (25 mm)
 11. Maximum Aggregate Size: 1 inch (40 mm).
 12. Drying Shrinkage:
 - a. Typical: Maximum 0.050 percent unless otherwise indicated.
 - b. Slabs-on-Grade and Suspended Slabs: Maximum 0.045 percent.
 - c. Shrinkage Reducing Admixture: Provide as required to attain maximum drying shrinkage when adequate shrinkage data for concrete mix design is not available.
- G. Patching Mortar: Mix in proportions by volume of one-part cement to two parts water. Substitute white cement for part of cement as necessary to produce color matching surrounding concrete.

2.7 MIXING

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C 685. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
- B. Transit Mixers: Comply with ASTM C 94/C 94M.

2.8 SOURCE QUALITY CONTROL

- A. An independent testing agency will perform source quality control review, as specified in Division 1.
- B. Review mix designs and certificates of compliance for materials Contractor proposes to use.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.2 PREPARATION

- A. Verify that forms are clean and free of rust before applying release agent.

- B. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- C. Roughen surfaces of previously placed and existing concrete to 1/4 inch (7 mm) amplitude by heavy sand-blasting, waterblasting or bush-hammering. Prior to receiving concrete, clean surfaces of dust and debris using compressed air or water.
- D. Clean surfaces of reinforcement and forms previously coated with cementitious materials by wire brushing or other acceptable means.
- E. Thoroughly wet all concrete and wood forms before application of concrete. Do not allow free water to remain on the surface.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301-16.
- B. Place concrete for floor slabs in accordance with ACI 302.1R02.
- C. Notify Architect not less than 48 hours prior to commencement of placement operations.
- D. Do not place concrete until testing agency has inspected reinforcing placement.
- E. Water may be added once to each truckload in the field provided the specified water-cement ratio is maintained.
- F. Ensure reinforcement, inserts, embedded parts, and formwork and subgrade will not be disturbed during concrete placement.
- G. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- H. Place concrete continuously between predetermined expansion, control, and construction joints.
- I. Maximum placement area for placing of concrete to be 10,000 square feet. Contractor to submit proposed construction joint locations.
- J. Do not interrupt successive placement; do not permit cold joints to occur.
- K. Consolidate concrete in accordance with ACI 309-05.
- L. Saw cut control joints in slab-on-grade within 24 hours after placing. Use 3/16 inch (5 mm) thick blade, cut into 1/4 depth of slab thickness as indicated on drawings. Locate control joints a maximum of 30 times the slab thickness in each direction. Limit the ratio of control joint spacing for each direction to 1.25.
- M. Screed floors level, maintaining the following minimum F(F) Floor Flatness and F(L) Floor Levelness values when measured in accordance with ASTM E 1155/ASTM E 1155M.
 - 1. F(F): Specified Overall Value (SOV) of 35; Minimum Localized Value (MLV) of 24.
 - 2. F(L): Specified Overall Value (SOV) of 25; Minimum Localized Value (MLV) of 17.

3.4 CONCRETE FINISHING

- A. Drypack surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch (6 mm) or more in height.
- C. Concrete Beams, Girders, Walls, and Columns: Smooth formed.
- D. Concealed Concrete Surfaces: Rough Formed
- E. Concrete Slabs: Finish to requirements of ACI 302.1R02, and as follows, unless otherwise noted on architectural drawings:
 - 1. Steel trowel surfaces that will receive carpeting, resilient flooring, seamless flooring, thin set quarry tile, thin set ceramic tile, and Fluid Applied Waterproofing.
 - 2. Steel trowel surfaces that will be left exposed.
 - a. Chemical Hardener: After slab has cured, apply water-diluted hardener in three coats per manufacturer's instructions.
 - 3. Float surfaces that will be left exposed in non-public areas

3.5 CURING AND PROTECTION

- A. Comply with requirements of ACI 308-11. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 - 1. Normal and light weight concrete: Not less than 7 days.
- C. Formed Surfaces: Cure by moist curing with forms in place. Provide curing for remainder of curing period after form removal.
- D. Surfaces Not in Contact with Forms:
 - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
 - 2. Final Curing: Begin after initial curing but before surface is dry.
 - a. Moisture-Retaining Cover: Seal in place with waterproof tape or adhesive.
 - b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.6 FIELD QUALITY CONTROL

- A. An independent testing agency shall perform field quality control tests, as specified in Division 1.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. City shall employ full time special inspectors during concrete placement.
- D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

- E. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure four concrete test cylinders. Obtain test samples for every 150 cu yd (114 cu m) or less of each class of concrete placed in any one day. 1 specimen tested at 7 calendar days, 2 specimens tested at 28 calendar days, and one specimen retained in reserve for later testing if required.
- F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C 143/C 143M.
- G. Concrete Temperature: Test hourly when air temperature is 40F (4C) and below, and when 80F (27C) and above; and each time a set of compression test specimens is made.
- H. Review the ticket of each batch of concrete delivered to the site for conformance.
- I. Verify proper curing procedure and applications at initial curing and final curing stages.
- J. Verify within 72 hours after placement that floor tolerances are within the limits specified herein.

3.7 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Where deficiencies are noted, the testing agency or Contractor to report defective concrete in writing to Architect within 24 hours.
- C. Repair or replacement of defective concrete shall be determined by the Architect. The cost of additional testing, repair and design services to be borne by Contractor when defective concrete is identified.
- D. Contractor to submit repair of defective concrete within 2 days of discovery.
- E. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

END OF SECTION

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SECTION 04 27 31 – REINFORCED UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete Block.
- B. Mortar and Grout.
- C. Reinforcement and Anchorage.
- D. Accessories.

1.2 RELATED REQUIREMENTS

- A. Section 03 2000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.

1.3 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.
- B. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2005.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- D. ASTM A 572/A 572 M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2001.
- E. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts; 2000.
- F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2014.
- G. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2014.
- H. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.
- I. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2014.
- J. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2014.
- K. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- L. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- M. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- N. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2012.
- O. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.

- P. ASTM C476 - Standard Specification for Grout for Masonry; 2010.
- Q. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.
- R. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
- S. ASTM C1019 - Standard Test Method for Sampling and Testing Grout; 2013.
- T. ASTM C1072 - Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2013.
- U. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2012.
- V. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry; 2010.
- W. ASTM F 844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use; 2004e1.

1.4 SUBMITTALS

- A. See Division 01 for submittal procedures.
- B. Product Data: Provide data for masonry units, mortar and grout, and joint materials.
- C. Shop Drawings: Indicate bar sizes, spacings, reinforcement quantities, bending and cutting schedules, reinforcement supporting and spacing devices, accessories and control joint locations. Do not reproduce contract documents for shop drawings.
- D. Grouting Procedures: Indicate type of grouting technique, lift and pour heights, sequencing, cleanout locations and details.
- E. Design Data: Indicate required mortar strength, unit assembly strength in each plane, and supporting test data used to establish masonry strength. Submit mix designs for mortar and grout, stamped and signed by a registered Professional Engineer in the State of California.
 - 1. Establish masonry assembly strength using one of the following methods:
 - a. Unit Strength Method: In accordance with current California Building Code Section 2105.2.2.1. The compressive strength of the concrete masonry unit to be 1,900 psi
 - b. Prism Test Method: In accordance with current California Building Code Section 2105.2.2.2.
- F. Manufacturer's Certificate: Certify that masonry units, cement, aggregates, lime and admixtures meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
 - 1. Maintain one copy of each document on project site.

1.6 REGULATORY REQUIREMENTS

- A. Conform to the California Building Code, latest adopted edition.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Protect cementitious materials against exposure to moisture. Use of cementitious or other materials that have become caked and hardened from absorption of moisture will not be permitted.

1.8 FIELD CONDITIONS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 x 8 inches, unless otherwise noted on drawings, and nominal depths as indicated on the drawings for specific locations.
 - 2. Special Shapes: Provide non-standard blocks configured for other detailed conditions.
 - 3. Load-Bearing Units: ASTM C90, medium weight.
 - a. Hollow block, as indicated.
 - b. Compressive Strength: As required to establish strength of masonry block assembly, 1,900 psi minimum.
 - c. Exposed Faces: Manufacturer's standard color and texture where indicated.
 - d. Pattern: Per architectural drawings.
 - 4. Strength of Masonry Block Assembly: $F'm = 1,500$ psi, or as indicated on drawings.

2.2 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
 - 1. Hydrated Lime: ASTM C207, Type S.
 - 2. Mortar Aggregate: ASTM C144.
 - 3. Grout Aggregate: ASTM C404.

- B. 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).
- C. Water: Clean and potable.
- D. Admixtures: Use only with Architect's approval and not adversely affecting bond or compressive strength.
- E. Air-Entraining Admixture: Not permitted.

2.3 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers of Joint Reinforcement and Anchors:
 - 1. Dur-O-Wal; Product Seismic Combs: www.dur-o-wal.com.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420) for sizes #7 and smaller.
 - 1. Deformed billet-steel bars.
 - 2. Unfinished.
- C. Reinforcing Steel: ASTM A 706/A 706M Grade 60 (420) for #8 and larger bars and all bars to be welded. Permitted for bars #7 and smaller.
 - 1. Deformed low-alloy steel bars.
 - 2. Unfinished.
- D. Headed Anchor Rod: ASTM F1554, Grade 36.
- E. Threaded Anchor Rod: ASTM A36.
- F. Nuts: ASTM A563 Grade A.
- G. Unhardened Flat Washers: ASTM F844.

2.4 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
 - 1. Manufacturers:
 - a. Dur-O-Wal; Product Regular D/A 2001: www.dur-o-wal.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self-expanding; 3 inch wide x by maximum lengths available.
 - 1. Manufacturers:

- a. Dur-O-Wal: www.dur-o-wal.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
- 1. Manufacturers:
 - a. PROSOCO; Product Sure Klean 101 Lime Solvent: www.prosoco.com.
 - b. Diedrich Technologies; Diedrich 200 Lime Solvent: www.diedrichtechnologies.com.

2.5 MORTAR MIXES

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 - 1. Engineered Masonry; Type M.
 - 2. Masonry below grade and in contact with earth; Type S.
- B. Aggregate for mortar to conform to ASTM C 144, Aggregates for Masonry Mortar.
- C. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

2.6 MORTAR MIXING

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Add approved mortar color and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
- D. Do not use anti-freeze compounds to lower the freezing point of mortar.
- E. If water is lost by evaporation, re-temper only within two hours of mixing.
- F. Do not use air-entraining admixtures.

2.7 GROUT MIXES

- A. Engineered Masonry: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
 - 1. Fine grout for spaces with smallest horizontal dimension of 2 inches clear or less.
 - 2. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches clear.
- B. Aggregate for grout to conform to ASTM C 404, Aggregates for Grout.

2.8 GROUT MIXING

- A. Mix grout in accordance with ASTM C94/C94M.
- B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

- C. Add approved admixtures in accordance with manufacturer's instructions; mix uniformly.
- D. Do not use anti-freeze compounds to lower the freezing point of grout.
- E. Do not use air-entraining admixtures.

2.9 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Division 1.
- B. Concrete Masonry: Test each type, class, and grade of concrete masonry unit in accordance with ASTM C140/C140M for conformance to requirements of this specification.
- C. Mortar Mixes: Review mix designs and test mortars prebatched by weight in accordance with ASTM C 780 recommendations for preconstruction testing.
- D. Grout Mixes: Review mix designs and test grout batches in accordance with ASTM C 1019 procedures.
- E. Materials: Review certificates of compliance.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
 - 1. Base or foundation surface is level to permit bed joint within range of 1/4 to 3/4 inch.
 - 2. Edge is true to line to permit protection of masonry to less than 1/4 inch.
- 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.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Clean reinforcement of loose rust, dirt, mill scale, concrete or other foreign materials which will reduce bond to mortar.
- C. Clean concrete surfaces to receive masonry. Remove laitance or other foreign material lodged in surfaces by sandblasting or other means as required.
- D. Ensure masonry units are clean and free from dust, dirt, or other foreign materials before laying.
- E. Provide temporary bracing, forms and shoring during installation of masonry work. Maintain in place until building structure provides permanent bracing and the grout strength meets or exceeds 75% of the required strength.

- F. For areas where high-lift grouting will be employed, provide cleanout openings as follows:
 - 1. Hollow Masonry: Not less than 3 inches by 4 inches at the bottom of each cell containing reinforcing and not more than 32 inches on center for solidly grouted walls. Form by cutting out face shell of masonry unit.

3.3 COURSING

- A. Erect masonry in accordance with the California Building Code, latest edition, Chapter 21.
- B. Establish lines, levels, and coursing indicated. Protect from displacement.
- C. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- D. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches, unless otherwise noted on architectural drawings.
 - 3. Mortar Joints: Concave, flush where finished with CEM plaster.

3.4 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 as work progresses.
- E. Interlock intersections and external and internal corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Stop masonry work by racking back 1/2 masonry unit length in each course, do not tooth.
- I. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

3.5 REINFORCEMENT AND ANCHORAGE

- A. Place reinforcement in accordance with the California Building Code, Chapter 21, to within 1/2 inch of specified location.
- B. Reinforcement Bars: Secure at intervals not exceeding 200 bar diameters and to avoid displacement during grouting. Minimum bar spacing as noted on drawings.
 - 1. Locate reinforcing splices as indicated.

- C. Joint Reinforcing/Confinement: Install at locations and at spacings indicated on the drawings.
- D. Reinforced Hollow Unit Masonry: Keep vertical cores to be grouted clear of mortar, including bed area of first course.
 - 1. Bond Beams: At bond beams or other locations for horizontally reinforced masonry, provide special masonry units or saw to accommodate reinforcement.

3.6 MASONRY FLASHINGS

- A. Install flashing as indicated on Architectural drawings.

3.7 GROUTING

- A. Use either high-lift or low-lift grouting techniques, at Contractor's option, as limited below, subject to other limitations of contract documents.
- B. Low-Lift Grouting:
 - 1. Conform to the requirements of the California Building Code, latest edition, Chapter 21.
 - 2. Do not use at locations with block exposed with finish structure on both faces.
 - 3. Limit height of pours to 5 feet.
 - 4. Limit height of masonry to the height of the pour.
 - 5. Pour grout only after reinforcing is in place. Prevent displacement of bars as grout is poured.
 - 6. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1 hour.
- C. High-Lift Grouting:
 - 1. Conform to the requirements of the California Building Code, latest edition, Chapter 21
 - 2. Do not use high-lift grouting technique for grouting of CMU unless minimum cavity dimension is 3 inches or larger.
 - 3. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
 - 4. Remove mortar fins protruding more than 1/2 inch into grout space. Clean out masonry cells and other cavities to be grouted by high pressure water spray or compressed air. Remove debris, allow to dry, and inspect before sealing cleanout openings.
 - 5. As masonry units are laid, embed lateral tie reinforcing in mortar joints where shown.
 - 6. Construct masonry to full height of maximum grout pour specified prior to placing grout.

7. Hollow Masonry: Limit lifts to maximum 6 feet and pours to maximum height as allowed by ACI 530/ASCE 5/TMS 402 and the California Building Code, latest edition, Chapter 21 and Table 21-C.
 8. After final inspection, close clean-out holes and brace closures to resist grout pressures.
 9. Place grout in final position within 1 1/2 hours after introduction of mixing water.
 10. Place grout for spanning elements in single, continuous pour.
- D. Stop grout below the top of the last course as detailed on the drawings, except at top course where it is to be brought to the top of wall.

3.8 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control joints, except as indicated on drawings.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.9 BUILT-IN WORK

- A. As work progresses, install built-in items as 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 and fill frame voids solid with grout, unless otherwise noted on architectural drawings.

3.10 TOLERANCES

- A. Maximum Variation from Alignment of Columns and Pilasters: 1/4 inch.
- B. Maximum Variation From Unit to Adjacent Unit: 1/32 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 Joint Thickness: 1/8 inch in 3 ft.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.11 CUTTING AND FITTING

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

3.12 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Division 1.
- B. Inspection: Provide special inspection in accordance with the California Building Code, latest edition, Chapter 17.
- C. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for conformance to requirements of this specification.
- D. Mortar Tests: Test each type of mortar in accordance with recommended procedures in ASTM C780, testing with same frequency as masonry samples.
- E. Test and evaluate grout in accordance with ASTM C1019 procedures.
 - 1. Provide grout testing when Unit Strength Method is used to establish F'm value for masonry assembly.
- F. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1314 and for flexural bond strength in accordance with ASTM C1072 or ASTM E518/E518M; perform tests and evaluate results.
 - 1. Provide prism testing when Masonry Prism Testing or Masonry Prism Test Record is used to establish F'm value for masonry assembly.
 - 2. Test frequency: Three prisms for each 5,000 sq.ft. of wall area.

3.13 POINTING AND CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. Point holes or defective mortar joints upon completion of work. Replace defective mortar where necessary. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution according to Manufacturer's written instructions.
- D. Use non-metallic tools in cleaning operations.

3.14 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.
- B. Provide protective boards and sheathing at exposed finished walls adjacent to any subsequent concrete placement.
- C. Protect all CMU from discoloration and damage of any type throughout the construction period. Protective tarps, boards, etc. shall be provided as required to maintain new finish by the contractor.

3.15 SCHEDULES

- A. See architectural drawings.

END OF SECTION

SECTION 05 12 00 - STRUCTURAL STEEL

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Structural steel framing members.
- B. Base plates, shear stud connectors and fasteners.
- C. Grouting under base plates.

1.2 RELATED REQUIREMENTS

- A. Section 05 31 00 - Steel Deck: Support framing for small openings in deck.

1.3 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual; American Institute of Steel Construction, Inc.; 2017.
- B. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 2016.
- C. AISC S341 - Seismic Provisions for Structural Steel Buildings, Including Supplement No. 1; American Institute of Steel Construction, Inc.; 2016.
- D. AISC S348 - Specification for Structural Joints Using ASTM A325 or A490 Bolts; 2009.
- E. ANSI B18.22.1 - Plain Washers; American National Standards Institute; 1965.
- F. ANSI B18.23.1 - Beveled Washers; American National Standards Institute; 1967.
- G. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2014.
- H. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- I. ASTM A 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2013.
- J. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- K. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016.
- L. ASTM A 276 - Standard Specification for Stainless Steel Bars and Shapes; 2017.
- M. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 2014.
- N. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2014.
- O. ASTM A 325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2014.

- P. ASTM A 490 - Standard Specification for Structural Bolts, Alloy Steel, Heat-Treated, 150 ksi Minimum Tensile Strength; 2014.
- Q. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- R. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts; 2015.
- S. ASTM A 563M - Standard Specification for Carbon and Alloy Steel Nuts [Metric]; 2015.
- T. ASTM A 572/A 572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2015.
- U. ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2015.
- V. ASTM A 898/A 898M - Standard Specification for Straight Beam Ultrasonic Examination of Rolled Steel Structural Shapes; 2017.
- W. ASTM A 992/A 992M - Standard Specification for Structural Steel Shapes; 2015.
- X. ASTM C 1107/C 1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2013.
- Y. ASTM E 164 - Standard Practice for Ultrasonic Contact Examination of Weldments; 2013.
- Z. ASTM E 709 - Standard Guide for Magnetic Particle Examination; 2015.
- AA. ASTM F 436 - Standard Specification for Hardened Steel Washers; 2016.
- AB. ASTM F 844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use; 2013.
- AC. ASTM F 1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2015.
- AD. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
- AE. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2015 and Errata.

1.4 SUBMITTALS

- A. See Division 01 for Construction Waste Management and Disposal, Sustainable Design Requirement, and Submittal Procedures for required submittals.
- B. Shop Drawings:
 - 1. Indicate grade of steel, profiles, sizes, spacing, lengths and locations of structural members, openings, shop surface treatments, attachments, fasteners, welds, and dimensional information.
 - 2. Indicate cuts, connections, holes and cambers.
 - 3. Indicate welded connections with AWS A2.4 welding symbols. Indicate size, type and net weld lengths. Clearly distinguish between shop and field welds.

4. Include complete details, schedules, procedures, and diagrams for fabrication and assembly.
 5. Setting drawings and templates for installation of anchor bolts and other anchorages.
 6. Do not reproduce construction documents.
- C. Manufacturer's Product Data: Provide for welding electrodes and filler metals, bolts, nuts, washers, and direct tension indicators.
- D. Manufacturer's Certificate of Conformance: Certify that fasteners, welding electrodes, shear stud connectors, grout, primer and paint meet or exceed specified requirements.
- E. Mill Test Reports: Indicate structural strength, and other properties required by the ASTM specification, including, destructive test analysis and non-destructive test analysis. Reports to be written in English.
1. Provide for all structural steel, bolts and fasteners, and shear stud connectors
- F. Welding Procedure Specification (WPS) and, as required, WPS Qualification Records for each weld applicable to project.
- G. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months issued by an independent testing agency.
1. Provide Welding Performance Qualification Records (WPQR) for all welding personnel.
- H. Contractor's Fabrication/Erection Inspector qualifications.
- I. Recycled Content:
1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product
 2. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
 3. If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
 4. If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.
- J. Local/Regional Materials:
1. Sourcing locations: Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
 2. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
 3. Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
 4. Product Component(s) Value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.
- 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING
- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
 - B. Store materials to permit easy access for inspection and identification.

- C. Store materials supported off the ground.
- D. Protect materials from rust corrosion, keep free of dirt, grease and other foreign matter.
- E. Welding materials to be in moisture resistant, undamaged packages. Maintain packages effectively sealed until electrode is required for use.
 - 1. Limit exposure on FCAW electrodes per AISC S341-16, Appendix W.

1.6 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC "Steel Construction Manual", AISC "Code of Standard Practice for Steel Buildings and Bridges" and AISC "Seismic Provisions for Structural Steel Buildings".
- B. Maintain one copy of each document on site.
- C. Fabricator: Company specializing in performing the work of this section with minimum 5 years of documented experience and AISC certified for "Standard Steel Building Structures".
- D. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience and an AISC Certified Steel Erector.
- E. Welders: Qualified in accordance with AWS D1.1 to perform type of welds required.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Steel Angles and Channels: ASTM A 36/A 36M.
- B. Steel W Shapes and Tees: ASTM A 992/A 992M.
 - 1. Heavy Sections, with flanges thicker than 1 1/2 inches. Provide with charpy v-notch values in accordance with AISC "Steel Construction Manual", Section A3.1c and AISC S341, Section 6.3.
- C. Steel Plates: ASTM A36 or ASTM A 572, Grade 50 as indicated on drawings.
 - 1. Plates 2 inches thick and greater: Provide with charpy v-notch values in accordance with AISC S341, Section 6.3.
- D. Stainless Steel Shapes, Plates and Bars: ASTM A 276.
- E. Cold-Formed Structural Tubing (HSS): ASTM A 500, Grade B.
- F. Pipe: ASTM A 53/A 53M, Grade B, Finish black.
- G. Shear Stud Connectors: Made from ASTM A 108 Grade 1015 bars and in accordance with AWS D1.1.
- H. Threaded Stud Connectors: Made from ASTM A 108 Grade 1015 bars and in accordance with AWS D1.1.
- I. Structural Bolts and Nuts: Carbon steel, ASTM A 307, Grade A galvanized to ASTM A 153/A 153M, Class C.

- J. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M) with matching ASTM A 563 (ASTM A 563M) nuts and ASTM F 436 washers, Type 1, medium carbon, plain.
- K. Headed and Unheaded Anchor Rods: ASTM F 1554, Grade 36, plain, with matching ASTM A 563 or A 563M nuts and ASTM F 436 Type 1 washers.
- L. Threaded Rod: ASTM A 572/A 572M, Grade 50.
- M. Unhardened Flat Washers: ASTM F 844 and ANSI B 18.22.1.
- N. Unhardened Beveled Washers: ANSI B 18.23.1.
- O. Welding Materials: AWS D1.1; type required for materials being welded.
 - 1. Electrodes to be low hydrogen types E7XTX, E7XTXX or E70XXX as applicable.
 - 2. Hydrogen level to be in accordance with AISC S341-16.
 - 3. Demand Critical Welds: Occuring at complete joint penetration welds, beam to column moment connections, brace connections, and welds noted "CVN" on drawings, unless otherwise noted on drawings.
 - a. Provide material with charpy v-notch (CVN) toughness in accordance with AISC S341-16, Section A3.4b.
- P. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C 1107/C 1107M and capable of developing a minimum compressive strength of 7,000 psi (48 MPa) at 28 days.
- Q. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
- R. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.2 FABRICATION

- A. Fabricate structural steel in one location by one fabricator, no more than 500 miles away from the project site.
- B. Shop fabricate to greatest extent possible.
- C. At beams supporting metal deck with concrete, space shear stud connectors at 12 inches (305 mm) on center, unless otherwise noted.
- D. Provide camber for beams and girders as indicated on the drawings.

2.3 FINISH

- A. Prepare structural component surfaces in accordance with SSPC SP -1 and SP-2 or SP-3.
- B. Shop prime structural steel members in accordance with manufacturer's instructions. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.
- C. Prepare slip-critical joints for Class A coatings in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
- D. Galvanize structural steel members and fasteners permanently exposed to weather in accordance with ASTM A 123/A 123M and ASTM A 153/A 153M.

2.4 SOURCE QUALITY CONTROL

- A. The City's testing agency shall perform source quality control reviews, as specified in Division 1.
- B. Structural Steel: Review Certificates of Compliance and Mill Test Reports obtained from the mills producing the steel. Verify that the steel meets the requirements of the construction documents.
- C. Weld Metal and Procedures: Review the following for conformance:
 - 1. Certificates of Compliance for all weld metals used in the work.
 - 2. Welding Procedure Specifications (WPS) and Prequalification Records (PQR).
 - 3. Welder Certifications and re-qualification tests.
- D. Welded Connections: Visually inspect all shop-welded connections, continuously inspect multi-pass welds and test 100 percent of complete penetration groove welds using the following:
 - 1. Ultrasonic testing performed in accordance with ASTM E 164.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.2 ERECTION

- A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".
- B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Coordinate work with the City's testing agency to assure that all tests and inspection procedures are properly provided. Cooperate fully with the testing and inspection agencies and provide the following:
 - 1. Shop fabrication and start time.
 - 2. Complete set of contract documents and reviewed shop drawings.
 - 3. Cutting lists, order sheets, material bills and shipping bills.
 - 4. Sample pieces as requested for testing.

5. Proper facilities to allow for testing and inspection, including but not limited to scaffolding and temporary work platforms.
 6. Schedule of shop welding, field welding, number of welders and tasks.
- D. Provide anchor rods, nuts, plate washers and 1/8 inch thick minimum anchor bolt setting templates as required by work of other sections.
 - E. Install beams with camber up.
 - F. Install high-strength bolts in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
 - G. Install structural bolts to snug tight condition and provide beveled washers under bolt heads or nuts resting on surfaces exceeding 5 percent slope relative to the head or nut.
 - H. Perform welding in accordance with AWS D1.1 and AISC S341, Appendix W.
 - I. Weld shear stud connectors in accordance with the manufacturer's instructions.
 - J. Do not field cut or alter structural members without approval of Architect.
 - K. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
 - L. Repair galvanized steel in accordance with ASTM A780
 - M. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.3 TOLERANCES

- A. Comply with the frame tolerances of AISC "Code of Standard Practice for Steel Buildings and Bridges"

3.4 FIELD QUALITY CONTROL

- A. The City's testing agency shall perform field quality control tests, as specified in Division 1.
- B. High-Strength Bolts: Provide verification of field-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
- C. Review Welder Certifications and re-qualification tests.
- D. Review Welding Procedure Specifications (WPS) and Prequalification Records (PQR).
- E. Visually inspect all shop and field erection and inspect bolted connections, verifying that all plies of connected elements are brought into firm contact.
- F. Visual Welding Inspection: Provide in accordance with AWS D1.1 and AISC S341-16, Appendix Q, Section Q5.1.
 1. Visually inspect 100 percent of field welds.
 2. Continuously inspect complete penetration welds, multi-pass fillet welds, partial joint penetration welds, plug welds, and slot welds.
- G. Nondestructive Weld Testing: Provide in accordance with AWS D1.1 and AISC S341-16, Appendix Q, Section Q5.2.

1. Ultrasonic testing performed in accordance with ASTM E 164 and AWS D1.1.
 - a. Complete penetration groove welds: Test 100 percent of welds, a minimum of 24 hours after completion.
 - b. W Shapes flanges or plates thicker than 1 1/2 inches:
 - 1) Test within 6 inches in any direction of weldament.
 - 2) Test in accordance with ASTM A 435 or ASTM A 898 Level 1 Criteria, in zones 3 inches above and below beam flange connection locations.
 2. Magnetic particle inspection performed in accordance with ASTM E 709.
 - a. Complete penetration groove welds: Test 25 percent of areas with back-up bars removed prior to placing any reinforcing fillet welds.
- H. Stud connectors: Test connectors in accordance with AWS D1.1 and verify the type and capacity of the welding equipment is in accordance with the manufacturer's recommendations.
- I. Grout: Review mixing of grout under base plates and sample using four 2-inch mortar cubes. Test for ultimate compressive strength at 1, 7 and 28 days after placing and hold the fourth cube until the end of the project. Sample one set minimum for each day that grout is placed.

END OF SECTION

SECTION 05 12 13 - ARCHITECTURALLY-EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Additional requirements for structural steel members designated as architecturally-exposed structural steel (AESS).

1.2 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing: General requirements for structural steel members, including AESS framing specified in this section.
- B. Section 05 21 00 - Steel Joist Framing: Alignment and location of bridging where joists are visible.
- C. Section 05 31 00 - Steel Decking: Erection requirements relating to exposed steel decking and its connections.
- D. Section 05 50 00 - Metal Fabrications: Loose steel bearing plates and miscellaneous steel framing.
- E. Section 07 81 00 - Applied Fireproofing: Fireproof protection to framing and metal deck systems.
- F. Section 09 91 13 - Exterior Painting: Finish coat requirements and coordination with primer and surface preparation specified in this section.
- G. Section 09 91 23 - Interior Painting: Finish coat requirements and coordination with primer and surface preparation specified in this section.
- H. Section 09 96 00 - High-Performance Coatings: Finish coat requirements and coordination with primer and surface preparation specified in this section.

1.3 REFERENCE STANDARDS

- A. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2016.
- B. AISC 360 - Specification for Structural Steel Buildings; 2010.
- C. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2014.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- F. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009 (Reapproved 2015).
- G. ASTM A1085/A1085M - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS); 2015.

- H. 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.
- I. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- J. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- K. SSPC-SP 1 - Solvent Cleaning; 2015.
- L. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Schedule and conduct a pre-installation meeting at project site one week prior to start of work of this section; require attendance by all affected installers. Coordinate requirements for shipping, special handling, storage, attachment of safety cables and temporary erection bracing, final coating, touch-up painting, mock-up coordination, Architect's observations, and other requirements for AESS.

1.5 SUBMITTALS

- A. See Division 01 for submittal procedures.
- B. Product data for each type of product specified. Submit paint systems in accordance with Section 09 91 13.
- C. Shop Drawings: Detailing for fabrication of AESS components.
 - 1. Provide erection documents clearly indicating which members are AESS members and the AESS category of each part.
 - 2. Include details that clearly identify AESS requirements found in this specification. Provide connections for AESS consistent with concepts shown on drawings.
 - 3. Indicate welds by AWS A2.4 symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined by the designated AESS category.
 - 4. Indicate orientation of hollow structural section (HSS) seams and mill marks (where applicable).
 - 5. Indicate type, size, finish and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tensioned shear/bearing connections. Indicate orientation of bolt heads.
 - 6. Indicate which surfaces or edges are exposed and what class of surface preparation is being used.
 - 7. Indicate special tolerances and erection requirements as noted on drawings or defined by the designated AESS category.
 - 8. Indicate vent or drainage holes for HSS members.
- D. AESS 1, AESS 2, AESS 3, AESS 4, and AESS C Samples: Provide samples of specific AESS characteristics. Samples may be small size samples or components of conventional structural steel demonstrating specific AESS characteristics, including surface preparation, sharp edges ground smooth, continuous weld appearance, weld show through, and fabrication mark removal.

- E. Qualification data for fabricator and erector to demonstrate their capabilities and experience. Include lists of completed projects names and address, names and addresses of architects and owners, photographs showing detail of installed AESS, and other information specified.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: In addition to those qualifications listed in Section 05 12 00, engage an AISC Certified Fabricator, experienced in fabricating AESS similar to that indicated for this project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the work.
- B. Erector Qualifications: In addition to those qualifications listed in Section 05 12 00, engage an AISC Certified Erector, experienced in erecting AESS work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.
- C. Comply with applicable provisions of AISC 303, Section 10 for the designated AESS category.
- D. Owner to engage a quality assurance agency per requirements of AISC 360, Chapter N and AISC 303, Section 10.

1.7 MOCK-UP

- A. Provide mock-ups for AESS 3, AESS 4, and AESS C of nature and extent indicated in Contract Documents.
- B. See Section 01 40 00 - Quality Requirements for additional requirements.
- C. Locate mock-ups in fabricator's shop. Mock-ups to be full-size unless Architect approves smaller models. Alternatively, when a mock-up is not practical, the first piece of an element or connection can be used to determine acceptability.
- D. Notify Architect one week in advance of dates and times when mock-ups will be available for review.
- E. Demonstrate applicable AESS characteristics for specified category of AESS on elements and joints in mock-up.
- F. Build mock-ups using member sizes and materials indicated for final work.
- G. Mock-up to demonstrate weld quality, contouring of welds at aligned walls of members, specified surface preparation, and finish coating.
- H. HSS members to extend at least 6 inches from joint in mock-up.
- I. Obtain Architect's written approval of mock-ups before starting fabrication.
- J. Retain and maintain mock-ups during construction in an undisturbed condition as a standard for judging completed work.
- K. Approved mock-ups in an undisturbed condition at Date of Substantial Completion may become part of completed work.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Handle finished pieces in accordance with Section 10 of AISC 303, using nylon-type slings, or chains with softeners, or wire ropes with softeners such that they are not damaged.

- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. Use special care in handling to prevent twisting or warping of AESS members.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Comply with Section 05 12 00, except as amended in this section for aesthetic purposes.
- B. Comply with AISC 303, Section 10 for specific AESS category designated on drawings.

2.2 FABRICATION

- A. Fabricate and assemble AESS in shop to greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by Architect. Detail AESS assemblies to minimize field handling and expedite erection.
- B. Permissible tolerances for member depth, width, out of square, and camber and sweep to be as specified in ASTM A6/A6M, ASTM A500/A500M, and ASTM A1085/A1085M.
- C. For curved structural members, whether composed of a single standard structural shape or built-up, the as-fabricated variation from theoretical curvature to be equal to or less than standard camber and sweep tolerances permitted for straight members in applicable ASTM standard.
- D. Use special care in handling and shipping of AESS both before and after shop painting to minimize damage to any shop finish. Use nylon-type slings or softeners when using chains or wire rope slings.
- E. Bolted Connections:
 - 1. Make in accordance with Section 05 12 00. Provide bolt type and finish as noted herein.
- F. Welded Connections:
 - 1. Comply with AWS D1.1/D1.1M and Section 05 12 00.
 - 2. Assemble and weld built-up sections by methods that will maintain alignment of members without warp exceeding tolerances of this section.
- G. Surface Preparation:
 - 1. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
 - 2. Remove backing and run out tabs.
- H. Fabricate AESS in accordance with categories defined in AISC 303, as follows:
 - 1. AESS 1: Basic elements.
 - 2. AESS 2: Feature elements viewed at a distance greater than 20 feet (feature elements not in close view).
 - 3. AESS 3: Feature elements viewed at a distance less than 20 feet (feature elements in close view).
 - 4. AESS 4: Showcase elements with special surface and edge treatment beyond fabrication (showcase elements).
 - 5. AESS C: Custom elements; fabricate to requirements of AESS 1 and the following characteristics:
 - a. C.1: _____.
 - b. C.2: _____.

c. C.3: _____.

2.3 PAINT SYSTEM

- A. Compatibility: All components/procedures of AESS paint system to comply with coating system specified, submitted, and approved per Sections 09 91 13, 09 91 23, and 09 96 00. As a minimum, identify required surface preparation, primer, intermediate coat (if applicable), and finish coat. Primer, intermediate coating, and finish coating to be from a single manufacturer combined in a system documented by manufacturer with adequate guidance for fabricator to procure and execute.
- B. Primer: As specified in Sections 09 91 13, 09 91 23, and 09 96 00. Primer to comply with all federal standards for VOC, lead and chromate levels.
- C. Finish Coating: Field apply intermediate and top coats per Sections 09 91 13, 09 91 23, and 09 96 00.

2.4 SHOP PRIMING

- A. Surface Preparation:
 - 1. Provide surface preparations to meet SSPC-SP 6.
 - 2. Coordinate required surface profile with approved paint submittal prior to beginning surface preparation.
 - 3. Prior to blasting, remove any grease and oil using solvent cleaning to meet SSPC-SP 1.
 - 4. Remove weld spatter, slivers and similar surface discontinuities.
 - 5. Ease sharp corners resulting from shearing, flame cutting or grinding.
- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted with slip-critical connections.
 - 1. Extend priming of members partially embedded in concrete or mortar to a depth of 2 inches.
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop primer to surfaces that are inaccessible after assembly or erection.

2.5 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by hot-dip process to AESS indicated for galvanizing according to ASTM A123/A123M. Fabricate such that all connections of assemblies are made in the field with bolted connections where possible.

2.6 MATERIALS

- A. General: Meet requirements of 05 12 00 as amended below.
- B. Tension Control, High-Strength Bolts, Nuts, and Washers: Per section 05 12 00, Tension Control Bolts. Provide standard carbon steel finish rounded bolt heads with twist off bolts; ASTM F3125/F3125M.

2.7 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

- B. Structural Requirements:
 - 1. Comply with quality control requirements per AISC 360, Chapter N and AISC 303, Section 10. Refer to Section 05 12 00 for additional requirements.
 - 2. Quality assurance agency to review work for compliance with requirements of AISC 360, Chapter N and AISC 303, Section 10.
- C. AESS 1 and 2 Acceptance: Architect to observe AESS in the shop at a viewing distance consistent with final installation and determine acceptability based on qualification data and submittals. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.
- D. AESS 3,4, and C Acceptance: Architect to observe AESS in the shop at a viewing distance consistent with final installation and determine acceptability based on approved mock-up. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Erector to check all AESS members upon delivery for twist, kinks, gouges or other imperfections which may result in rejection of appearance of member. Coordinate remedial action with fabricator prior to erecting steel.

3.2 PREPARATION

- A. Provide connections for temporary shoring, bracing and supports only where noted on approved fabrication documents. Temporary connections not shown are to be made at locations not exposed to view in final structure or as approved by Architect.
- B. Handle, lift and align pieces using nylon straps or chains with softeners required to maintain appearance of AESS through process of erection.

3.3 ERECTION

- A. AESS 1 and 2: Basic elements; feature elements not in close view:
 - 1. Employ special care to handle and erect AESS. Erect finished pieces using nylon straps or chains with softeners such that they are not damaged.
 - 2. Place weld tabs for temporary bracing and safety cabling at points concealed from view in completed structure or where approved by Architect during pre-installation meeting. Obtain Architect approval of methods for removing temporary devices and finishing AESS members prior to erection.
 - 3. AESS Erection Tolerances: Erect to standard frame tolerances for structural steel per Chapter 7 of AISC 303.
 - 4. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
 - 5. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
 - 6. Remove all backing and run out tabs.
 - 7. When temporary braces or fixtures are required to facilitate erection, take care to avoid any blemishes, holes or unsightly surfaces resulting from use or removal of such temporary elements.
 - 8. Bolted Connections: Align bolt heads on same side of connection as indicated on approved fabrication or erection documents.

9. Welded Connections: Comply with AWS D1.1/D1.1M and Section 05 12 00. Appearance and quality of welds to be consistent. Employ methods that will maintain alignment of members without warp exceeding tolerance of this section.
 10. Remove weld spatter exposed to view.
 11. Grind off projections larger than 1/16 inch at field butt and plug welds.
 12. Continuous Welds: Where continuous welding is noted on drawings, provide continuous welds of a uniform size and profile.
 13. Do not enlarge holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection plates that are misaligned where holes cannot be aligned with acceptable final appearance.
 14. Splice members only where indicated.
 15. Obtain permission for any torch cutting or field fabrication from Architect. Finish sections thermally cut during erection to a surface appearance consistent with mock-up.
- B. AESS 3: Feature elements in close view:
1. Erect to requirements of AESS 1 and 2 and as follows:
 2. Field Welding: Weld profile, quality, and finish to be consistent with mock-ups approved prior to fabrication.
 3. Provide a continuous appearance to all welded joints including tack welds. Provide joint filler at intermittent welds.
- C. AESS 4: Showcase elements:
1. Erect to requirements of AESS 3 and as follows:
 2. Grind welds smooth.
 3. Minimize Weld Show Through: At locations where welding on far side of an exposed connection creates distortion, grind distortion and marking of steel to a smooth profile with adjacent material.
 4. Filling of Weld Access Holes: Where holes must be cut in web at intersection with flanges on W shapes and structural tees to permit field welding of flanges, fill holes with joint filler.
 5. Where welds are indicated to be ground, contoured, or blended, oversize welds as required and grind to provide a smooth transition and match profile on approved mock-up.
- D. AESS C: Custom elements:
1. Erect to requirements of AESS 1 and 2 and as follows:
 - a. _____.
 - b. _____.
- 3.4 FIELD QUALITY CONTROL
- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Structural Requirements:
1. Comply with quality control requirements per AISC 360, Chapter N and AISC 303, Section 10. Refer to Section 05 12 00 for additional requirements.
 2. Quality assurance agency to review work for compliance with requirements of AISC 360, Chapter N and AISC 303, Section 10.
- C. AESS 1 and 2 Acceptance: Architect to observe AESS in place and determine acceptability based on qualification data and submittals. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

- D. AESS 3,4, and C Acceptance: Architect to observe AESS in place and determine acceptability based on qualification data and submittals as well as on approved mock- up. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

3.5 CLEANING

- A. Touch-up Painting: Complete cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint to blend with adjacent surfaces of AESS. Perform touch-up work in accordance with manufacturer's instructions and as specified in Section 09 91 13, 09 91 23, and 09 96 00.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas. Repair galvanized surfaces in accordance with ASTM A780/A780M.
- C. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

END OF SECTION

SECTION 05 12 19 – BUCKLING RESTRAINED BRACES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Completed Buckling-restrained Brace (BRB) assemblies ready for installation. A BRB assembly includes the buckling-restrained brace and all required fasteners, and connections necessary to connect the BRB components to each other.
- B. Splice plates and fasteners necessary to connect the splice plates to the BRB and the splice plates to the gusset plates.
- C. Gusset plates to connect to the structural steel framing.
- D. Engineering design requirements of BRB's.

1.2 RELATED REQUIREMENTS

- A. Section 01 40 00 – Quality Requirements
- B. Section 05 12 00 – Structural Steel

1.3 REFERENCE STANDARDS – Latest Edition at time of Bidding

- A. American Institute of Steel Construction (AISC):
 - 1. 360 - Specification for Structural Steel Buildings
 - 2. 341 - Seismic Provisions for Structural Steel Buildings
 - 3. S303 - Code of Standard Practice for Steel Buildings and Bridges
 - 4. RCSC - Specifications for Structural Joints Using ASTM A325 or A490 Bolts.
- B. American Society for Testing and Materials (ASTM):
 - 1. A36 - Structural Steel.
 - 2. A325 – Standard Specifications for Structural Bolts, Steel, heat treated, 120/105 ksi.
 - 3. A490 - Standard Specifications for Structural Bolts, Alloy Steel, heat treated, 150 ksi.
 - 3. A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 4. A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 - 5. A514 - High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.
 - 6. A563 - Carbon and Alloy Steel Nuts.
 - 7. A572 - Gr. 50 or Gr. 50
 - 8. E8 - Tension Testing
- C. American Welding Society (AWS):
 - 1. A2.4 - Symbols for Welding, Brazing, and Nondestructive Examination.
 - 2. D1.1 - Structural Welding Code.
 - 3. D1.8 - Structural Welding Code - Seismic Supplement.
- D. Steel Structures Painting Council (SSPC) - Steel Structures Painting Manual.
- E. California Building Code (CBC), 2016 Edition.

- F. Warnock Hercy - Certification Listings.

1.4 SYSTEM DESCRIPTION

- A. BRB hysteretic behavior is in the range of in-plane displacements up 2 times the design story drift. The BRB system shall not experience buckling, hysteretic pinching, and/or other degradation or loss of strength.
- B. BRB remains intact and provides for stable loading. The BRB allow for simultaneous axial loading, out-of-plane forces equaling 1g, and out-of-plane displacements equal to 2.0% of the installed story height indicated on the contract documents.
- C. Confining fill element shall remain unbonded to the steel while providing full confinement without degradation and/or loss of material. Provide end confining plates to ensure confinement of the fill while allowing for non-restricting movement of the core plate.
- D. The cross-sectional dimension of the BRB assembly shall match that provided in the contract documents. The dimensions of the steel tube and cruciform end dimension shall be determined as necessary for proper operation of the BRB assembly with the maximum dimension shown on the contract documents.
- E. Maximum brace factors for 'OMEGA' and 'BETA' indicated on the contract documents.
- F. Provide BRB assemblies maintenance-free for a life of 35 years. Maintenance-free shall mean that no replacement of parts is required and the confining fill element shall maintain function without degradation or loss of material. BRB components as specified in Section 2.1.
- G. BRB assemblies shall maintain their design properties within a temperature range of minus 17 to 45 degrees C (0 to 113 degrees F).

1.5 SUBMITTALS:

- A. See Division 01 for-Construction Waste Management and Disposal, Sustainable Design Requirement, and Submittal Procedures for required submittals.
 - 1. Provide all submittals in English.
- B. Shop/Erection Drawings: Submit for review:
 - 1. Indicate BRB location, size, dimensions, plate thicknesses, outer tube geometry, and connections. Show methods of installation, including type and size of bolts, pins, hole diameters, preparation and finish of faying surfaces and welds. Identify tolerances for fabrication and erection
 - 2. Component and overall assembly weights.
 - 3. Certified yield strength of steel plates.
 - 4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths and finishes.
 - a. Identify shop and field welds.
 - b. Identify Demand Critical (DC) welds requiring specialty filler metal.
 - 5. Review of drawings shall cover only the general scheme, design, and character of the details, but not the checking of dimensions. Such review shall not relieve the Contractor from responsibility for executing the work in accordance with the Drawings and coordination between the manufacturer and the Contractor.
- C. Certificates: Submit for information:

1. Manufacturer's Mill Certificates: Certify that materials meet specified requirements.
 2. Mill Test Reports: Submit indicating structural strength, stress-strain curve for the steel used in the BRB core, detailing yield force and ultimate strain, and destructive and non-destructive test analysis.
 3. Welder's Certificates: Certify welders employed on the Work, verifying AWS or equivalent qualification within the previous 12 months.
- D. Product Data: Submittal prior to commencing BRB design detailing the following:
1. Experience in supplying hysteretic damping devices for seismic applications.
 2. Description of previous similar projects.
 3. Installation instructions.
 4. Recommended periodic and post-earthquake maintenance, inspection, and testing requirements.
- E. Technical Submittal: Manufacturer to provide a technical submittal, stamped and signed by the Brace Manufacturers Design Engineer, prior to commencing BRB manufacture.
1. Manufacturer's experience in supplying hysteretic damping devices for seismic applications and description of previous similar projects.
 2. Brace Documented Design Methodology: AISC 341-16, Seismic Provisions for Structural Steel Buildings.
 3. Brace manufacturer's design engineer qualifications.
 4. Qualification Tests: Results from previous brace and sub-assembly testing, similar in size and scale to that required for the Work, performed in accordance with AISC 341-16, Section K.3.
 5. Design calculations demonstrating compliance with the requirements of the AISC 341-16 and the Construction Documents, for the brace assembly and connections.
 6. The brace connections to the building frame are to be designed and detailed by the BRB manufacturer, including, but not limited to bolting, welds, gusset plates and stiffeners, within the requirements specified in the Construction Documents.
 7. Recommended periodic and post-earthquake maintenance, inspection, and testing requirements.
- F. Quality Control: Submit to the City's testing agency, proposed quality assurance/quality control procedures in conformance with Section 1.06. Include results of quality assurance testing and inspection reports.
- G. Schedule: Submit schedule for manufacturing and delivery to site of complete BRB assemblies.
- 1.6 DESIGN REQUIREMENTS:
- A. Design Buckling Restrained Braces, connections and gusset plates in accordance with the latest published versions of AISC 341-16 Seismic Provisions, the 2016 California Building Code and the Construction Documents.
 - B. The Construction Documents cover the general scheme and character of the details. Field verification of existing conditions, tolerances and fit-up dimensions is required and is the responsibility of the Contractor.
- 1.7 QUALITY ASSURANCE:

- A. Manufacturer Qualifications: Shall have manufactured and successfully tested braces in accordance with AISC 341-16.
- B. Quality Assurance / Quality Control Plan: Meet the requirements of AISC S303-16, AISC 360-16 Chapters N and J and AISC 341-16. In addition, the plan is to include:
 - 1. Special inspection of brace fabrication, to include confirmation of fabrication and alignment tolerances and nondestructive methods for evaluation of the final product.
 - 2. Brace manufacturer's participation in an industry recognized quality certification program. Certification to include documentation that quality assurance plan is in compliance with the specified standards. The manufacturing and quality control procedures are to be equivalent to or better than those used to manufacture brace test specimens.
- C. BRB Design Engineer Qualifications: Registered Professional Engineer in the State of California, with a minimum of 5 years experience in the testing, design, and construction or buckling restrained braces.
- D. Erector Qualifications: See Section 05 12 00 - Structural Steel Framing.
- E. The City's testing agency, as specified in Division 1, is to provide Quality Assurance (QA) tasks per Chapter N of AISC 360-16, Chapter J of AISC 341-16, and as modified by Chapter 17 of the 2016 CBC.
- F. Regulatory Requirements: 2016 California Building Code, AISC 360-16 and AISC 341-16 requirements.

PART 2 – PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Braces to comply with AISC 341-16 and the 2016 California Building Code.
- B. Initial BRB yield force (P_{ysc}), over-strength factors (w , and b), effective elastic stiffness (K_{eff}), and dimensional limits are to be as specified on the Construction Documents.
- C. Design braces to accommodate deformations associated with 2 percent story drift or 2 times the design story drift, whichever is larger, in addition to deformations due to gravity loading.
- D. The confining fill is to provide full confinement without degradation and/or loss of material. Provide end confining plates to ensure confinement of the fill while allowing for non-restricting movement of the core plate.
- E. The cross-sectional area of the BRB core plates shall be determined based on the parameters specified in the contract documents and on the steel properties determined by the following coupon tests:
 - 1. Sample and test core plate steel in accordance with ASTM E8 and ASTM A370. Provide plot of tensile stress vs. elongation for each test. Report initial yield, yield at 0.2 percent offset, stress at 2.0% elongation, and maximum elongation of each specimen.
 - 2. Take samples from core plate steel at point of manufacture. The axis of the coupon test specimen is to be parallel to the axis of the brace core plates.

3. Test a minimum of three specimens from each heat of steel, spaced sufficiently to represent the plate used for the fabrication of the core plates for the project.
 4. Use the average yield stress (0.2% offset) for each heat of steel to confirm the yield stress properties used in the design of the sizes of the core plates for the BRB's.
 5. The average yield stress from coupon testing is to fall between 39 ksi and 45 ksi.
- F. The BRB assemblies are to be maintenance-free for a life of 50 years. Maintenance-free means that no replacement of parts required and the confining fill element maintains function without degradation or loss of material. The BRB assemblies are to maintain their design properties within a temperature range of 0 to 45 degrees celcius (32 to 113 degrees fahrenheit).
- G. Scratch plate assemblies to be designed and installed to be capable of indicating the expected movement without interference from surrounding structural or architectural components.

2.2 MANUFACTURERS:

- A. CoreBrace; www.corebrace.com
- B. Star Seismic; www.starseismic.net
- C. Nippon Steel Engineering USA, Inc; www.unbondedbrace.com.
- D. Or approved equal.

2.3 MATERIALS:

- A. Yielding Core Plate: ASTM A36/A36M or JIS G3136 SN400 B. Yield stress to be within the tolerances specified, as evidenced by coupon testing of plates used for brace fabrication.
 1. Plates 2 inches thick and thicker: Provide with charpy v-notch values in accordance with AISC 360-16 Section A3.1d and AISC 341-16, Chapter A3.3.
- B. Other Steel Plate: ASTM A36/A36M, JIS G3136 SN400 B, or equivalent, as required by the design.
- C. Structural Tubing: ASTM A500/A500M Grade B, or JIS G3466 STKR 400.
- D. Welding Materials: See Section 05 12 00 - Structural Steel Framing.
- E. Structural Steel Primer Paint: Section 05 12 00 - Structural Steel Framing.
- F. Debonding Agent: Manufacturer's standard; demonstrated suitable to maintain separation of steel core and grout encasement when subjected to a minimum of 30 cycles of inelastic yielding at 2.0 percent strain; resistant to aging effects for a life cycle of 50 years.
- G. Confining Fill Material: Manufacturer's standard cementitious grout; demonstrated suitable for function as a confining in-fill material by uniaxial or subassemblage qualification testing.

2.4 FABRICATION

- A. Fabricate steel in accordance with Section 05 12 00 - Structural Steel Framing.
 1. Splices in the steel core are not acceptable.

2. AESS braces are to further comply with AISC S303-16, Section 10.
- B. The maximum dimensions of the casing of the buckling restrained brace is to be as indicated on the drawings.

Pin Connections: Holes for pinned connections to be machined 1/32 inch larger than the pin diameter with a tolerance not exceed plus or minus 1/64 inch.
- C. Assembly: Assemble components of the Buckling Restrained Brace in a manner to ensure proper performance of the brace.
 1. Provide end-confining plates to ensure confinement of the fill material while allowing for non-restricting movement of the steel core.
 2. For braces exposed to exterior conditions, interior of brace is to be sealed or otherwise protected from moisture infiltration into the interior core region.

2.5 SOURCE QUALITY CONTROL

- A. The City's testing agency shall perform testing and inspections per this section, as specified in Division 1.
- B. Review Manufacturer's Quality Assurance Plan, mill certificates and results of coupon testing.
- C. Review Manufacturer's quality assurance test and inspection reports.
- D. Observe fabrication and assembly in accordance with AISC 360-16 and AISC 341-16.

Contractor is to notify City's Representative no less than 30 calendar days before the start of fabrication of the buckling restrained braces, to allow City's Representative to observe fabrication and assembly process.

- E. Perform testing and inspection in accordance with approved Quality Assurance Plan and requirements of Contract Documents.

PART 3 - EXECUTION

3.1 ERECTION:

- A. Erect BRB braces in accordance with referenced AISC Specifications. Manufacturer to coordinate with the Contractor and Steel Erector to verify lengths, connections, shipping, storage and field conditions.
- B. Provide lifting lugs to facilitate brace installation.
 1. Coordinate lifting lug locations so that when braces are lifted into place the scratch plate devices are correctly oriented.
 2. Lifting lugs are not to increase the overall thickness of the brace assembly when installed.
 3. At locations where braces are to be exposed to view, lifting lugs to be omitted and the Contractor is to use alternates means of brace installation.
 4. Do not attach lifting lugs to protected zones of brace.
- C. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of Buckling Restrained Braces.

- D. Connections for secondary or non-structural component attachments to buckling restrained brace members are not permitted, including field welding or shot pins.
- E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces noted in Section 3.2.
- F. Install scratch plate measure devices at the upper end on the top or bottom surface of each brace in a location visible from the inside of the building. Coordinate scratch plate locations with lifting lug locations as necessary for proper installation. Locate scratch plates as indicated on the Construction Documents.
- G. Install bolts in accordance with RCSC "Specification for Structural Joints Using High-Strength Bolts".
- H. Perform welding in accordance with AWS D1.1/D1.1M, AWS D1.8/D1.8M and AISC 341-16.

3.2 FIELD QUALITY CONTROL

- A. See Section 05 12 00 - Structural Steel Framing.
- B. Allow for erection loads. Provide sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of Buckling-restrained Braces.
- C. Field connect members with threaded fasteners; torque to required resistance.
- D. Do not field cut or alter structural members without approval of the Engineer.
- E. Prime welds, abrasions, and surfaces not shop primed after erection except surfaces to be in contact with grout or bolts.

END OF SECTION

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SECTION 05 31 00 – STEEL DECK

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Acoustical roof deck.
- B. Roof deck.
- C. Composite floor deck.
- D. Supplementary framing for openings up to and including 18 inches (450 mm).
- E. Bearing plates and angles.
- F. Stud shear connectors.
- G. Deck fastening
- H. Deck Shoring

1.2 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel: Support framing for openings larger than 24 inches (600 mm) and shear stud connectors.

1.3 REFERENCE STANDARDS

- A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2013.
- C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2006 and Errata.
- E. AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society; 2007.
- F. SDI (DM) - Publication No.31, Design Manual for Composite Decks, Form Decks, Roof Decks; Steel Deck Institute; 2007.
- G. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); The Society for Protective Coatings; 2002 (Ed. 2004).
- H. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.4 SUBMITTALS

- A. See Division 01 for-Construction Waste Management and Disposal, Sustainable Design Requirement, and Submittal Procedures for required submittals.

- B. Shop Drawings: Indicate deck plan, support locations, projections, openings, deck reinforcement, supplementary framing, deck type, deck orientation, fasteners, welds, shoring, pertinent details, and accessories.
- C. Product Data: Provide deck profile characteristics, dimensions, structural properties, installation instructions, ICBO report, and powder actuated fastener information.
- D. Certificates: Certify that meet or exceed requirements for each heat of steel and requirements for welding electrodes.
- E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.
- F. Headed stud product data.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years of experience.
- B. Welders and welding procedures to be qualified in accordance with AWS D1.1 and D1.3.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver store and handle decking in a manner to prevent damage or deformation.
- B. Cut plastic wrap to encourage ventilation.
- C. Store deck on dry wood sleepers; slope for positive drainage.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Steel Deck:
 - 1. Verco Manufacturing, Co; Product W3 Formlok & Type HSB: www.vercodeck.com.
 - 2. ASC Profiles; Product 3WxH and DGB-36: www.ascsd.com
 - 3. Nucor Corporation Vulcraft; Product 3VLI & 1.5BI. www.vulcraft.com.
 - 4. Or approved equal.

2.2 STEEL DECK

- A. Acoustical Roof Deck: Non-composite type, steel sheet with plain vertical flute faces perforated with 1/8 inch diameter holes staggered 3/8 inch on center:
 - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS) Grade 33/230, with G60/Z180 galvanized coating.
 - 2. Structural Properties: as noted on drawings.
 - a. Section modulus: 0.322 in³.
 - b. Span Design: Double minimum.
 - 3. Minimum Metal Thickness, Excluding Finish: 18 gage (0.0478 mm).
 - 4. Nominal Height: 1-1/2 inch (38 mm).
- B. Roof Deck: Non-composite type, fluted steel sheet:
 - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS) Grade 33/230, with G60/Z180 galvanized coating.

2. Structural Properties: as noted on drawings.
 - a. Section modulus: 0.322 in^3 .
 - b. Span Design: Double minimum.
 3. Minimum Metal Thickness, Excluding Finish: 18 gage (0.0478 mm).
 4. Nominal Height: 1-1/2 inch (38 mm).
- C. Composite Floor Deck: Fluted steel sheet embossed to interlock with concrete and factory vented:
1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS) Grade 33/230, with G60/Z180 galvanized coating.
 2. Structural Properties: as noted on drawings.
 - a. Span Design: Double minimum.
 3. Minimum Metal Thickness, Excluding Finish: 18 gage (0.0478 mm).

2.3 ACCESSORY MATERIALS

- A. Bearing Plates and Angles: ASTM A 36/A 36M steel, unfinished.
- B. Stud Shear Connectors: Made from ASTM A 108 Grade 1015 bars.
- C. Welding Materials: AWS D1.1; type required for materials being welded.
 1. Electrodes to be low hydrogen type E7XTX, E7XTXX, or E70XXX as applicable.
- D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.
- E. Flute Closures: Closed cell foam rubber, 1 inch (25 mm) thick; profiled to fit tight to the deck.
- F. Powder actuated fasteners, comply with Section 05050.
- G. Shear Resistant Angle: Deck and shear resistant angle manufacturer to be the same.
 1. Verco Manufacturing, Co; Product - SHEARTRANZ: www.vercodeck.com.
 2. ASC Profiles; Product - Q-Max: www.ascsd.com
 - 3.

2.4 FABRICATED DECK ACCESSORIES

- A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 18 gage (1.3 mm) thick sheet steel unless otherwise noted; of profile and size as indicated; finished same as deck.
- B. Roof Sump Pans: 14 gage (1.8 mm thick) sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches (38 mm) below roof deck surface, bearing flange 3 inches (75 mm) wide, sealed watertight. Unless otherwise noted on drawings.
- C. Floor Drain Pans: 14 gage (1.8 mm thick) sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches (38 mm) below floor deck surface, bearing flange 3 inches (75 mm) wide, sealed watertight. Unless otherwise noted on drawings.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions prior to beginning work.

3.2 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On steel supports provide minimum 2 inch (50 mm) bearing.
- C. Fasten deck to steel support member with attachment size and spacing as indicated on drawings.
- D. Attach seam side laps as indicated on the drawings.
- E. Remove water from deck and supporting steel prior to welding.
- F. Weld deck in accordance with AWS D1.3.
- G. At deck openings from 6 inches (150 mm) to 24 inches (600 mm) in size, provide angle reinforcement as indicated on the drawings.
- H. Where deck changes direction, install 6 inch (150 mm) minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches (300 mm) on center maximum.
- I. At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete. Provide stops of sufficient strength to remain stationary. Unless otherwise noted.
- J. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings, unless otherwise noted on the drawings. Do not interrupt continuity of deck flutes or concrete fill.
- K. Close openings below deck flutes and above walls and partitions perpendicular to deck flutes with single row of foam cell closures to prevent leakage of concrete.
- L. Place metal cant strips in position and fusion weld unless otherwise indicated.
- M. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
- N. Position floor drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
- O. Weld stud shear connectors through steel deck to structural members below. Do not install through lapped decking.
- P. Provide shoring of metal decking according to the ICBO report where construction loads exceed deck capacity and as indicated on the drawings.
- Q. Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.
- R. Install roof deck shear resistant angle in accordance with the drawings and manufacturers recommendations in locations indicated on the drawings.
- S. Do not support lights, ducts, acoustic tile ceilings, and other items from deck vent tabs.

- T. Immediately after damaging the deck finish or welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with galvanizing repair paint or touch-up primer for painted decking.

3.3 FIELD QUALITY CONTROL

- A. The City's testing agency will perform field quality control tests, as specified in Division 1.
- B. Review installed condition of deck units, framed openings, and accessories.
- C. Verify the size, type, spacing, and penetration of deck fastenings.
- D. Verify the settings of welding and shear connector installation equipment shall be verified to be in accordance with the manufacturer's recommendations.
- E. Inspect and test shear connectors in accordance with Section 05 12 00.
- F. Weld quality control test for Non-Composite Decking:
 - 1. Test the welding machine's settings and the operator's qualifications at the beginning of each day's work by the test procedure described in the SDI Manual of Construction with Steel Deck.
 - 2. Each welding machine and operator is to be qualified at the beginning of each day's work by the test procedure described in the SDI Manual of Construction with Steel Deck.
 - 3. Retest a new assembly should any weld fail.

END OF SECTION

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SECTION 05 40 00 – 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 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Load bearing cold-formed structural metal framing, including all design, engineering, materials, labor, equipment and services necessary for the complete fabrication, assembly delivery, anchorage and erection of the exterior light gauge metal framing system.

1.3 RELATED SECTIONS

- A. Section 05 12 00 - Structural Steel: Structural building framing.
- B. Section 09 22 16 - Non-Structural Metal Framing
- C. Section 09 22 19 - Cavity Shaft-Wall Assemblies
- D. Section 09 29 00 - Gypsum Board: Wall sheathing.

1.4 QUALITY ASSURANCE

- A. 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."
- B. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- C. 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."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 1. Delegated Design: Engage a qualified professional engineer, to design cold-formed steel framing. Professional engineer shall be licensed in the State of California.
- 2. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limit and under conditions indicated.
 - a. Design Loads: As indicated on structural drawings.

- b. Deflection Limits: design framing systems to withstand design loads without deflections greater than the following:
 - 1) Exterior Non-load bearing framing: Horizontal deflection of 1/360 of the wall height
- c. Design framing systems to provide for the 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 degree F.
- d. Design framing system to maintain clearances at openings, to allow for construction tolerances and to accommodate live load deflection of primary building structure as follows:
 - 1) Upward and downward movement of ½ inch.
- e. Design exterior non-load bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

2.2 MATERIALS

- A. Manufacturer's standard load-bearing steel studs and joists of type, size, shape, and gage as indicated.
- B. With each type of metal framing required, provide manufacturer's standard steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as recommended by manufacturer for application indicated as needed to provide a complete metal framing system.
- C. Conform to The Metal Stud Manufacturer's Association Handbook, ICC-ER Report No. 4943P.
 - 1. Studs: ASTM A653/653M sheet steel, 16 gage or as indicated, formed to channel shape, punched web; sized as shown on Drawings.
 - 2. Joists: ASTM A653/653M sheet steel, 16 gage or as indicated, formed to channel shape, punched web; sized as shown on Drawings.
 - 3. Track: Formed steel; channel shaped; same width as studs, tight fit; 18 gage thick minimum, solid web.
- D. Single Deflection Slip Track: Manufacturer's single, deep-leg, U-shaped slotted steel track; with stiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure.
- E. For 16-gage and heavier units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 50,000 psi; ASTM A653/653M.
- F. Provide galvanized finish to metal framing components that comply with ASTM A653/A653M for minimum G60 coating.
- G. Electrodes for Welding: Comply with AWS Code and recommendations of framing manufacturer.
- H. Galvanizing Repair: Use materials and methods for repair of galvanized surfaces damaged by welding, complying with ASTM A780/A780M.

2.3 PREFABRICATION

- A. Structural framing components may be prefabricated into panels prior to erection. Fabricate panels plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated panels to prevent damage or distortion.
- B. Fabricate panels in jig templates to hold members in proper alignment and position and to assure consistent component placement.
- C. Fastenings: Attach similar components by welding. Attach dissimilar components by welding, bolting, or screw fasteners, as standard with manufacturer.
- D. Wire tying of framing components is not permitted.

2.4 FABRICATION TOLERANCES

- A. Fabricate panels to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet.

2.5 FINISHES

- A. Galvanized Materials: G60 coating class.
- B. Primer: Compatible with shop coating and recommended for galvanized surfaces.

2.6 ACCESSORIES

- A. Bracing and Furring: Formed sheet steel, thickness determined for conditions encountered, standard shapes.
- B. Self-Drilling, Self-tapping Screws, Bolts, Nuts and Washers: ASTM A90/A90M, hot dip galvanized.
 - 1. Screws for Deflection Track: #8 wafer head.
- C. Anchorage Devices: Powder actuated.
- D. Welding: Perform welding operations conforming with AWS D1.1.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 05 40 00

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SECTION 05 50 00 – METAL FABRICATIONS

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 SECTION INCLUDES

- A. Shop fabricated ferrous metal items, galvanized and prime painted.
- B. Fabricated steel framing and support and steel items including the following:
 - 1. Rough hardware.
 - 2. Loose bearing and leveling plates.
 - 3. Loose steel lintels.
 - 4. Miscellaneous framing, supports and trim.
 - 5. Shelf and ledger angles.
 - 6. Metal bollards, concrete filled.
 - 7. Specialty Fabricated Products
 - 8. Accessories
 - 9. Ladders.
 - 10. Ladder safety cages.
 - 11. Vanity supports at bathrooms.
 - 12. Steel weld plates and angles for casting into concrete not specified in other Sections.
 - 13. Ornamental glass railing plate mounts.
 - 14. Steel framing and supports for Countertops.
 - 15. Steel framing and supports for operable partitions
- C. Products furnished, but not installed, under this Section include the following:
 - 1. Anchor bolt, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry

1.3 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified profession engineer to design ladders

- B. Structural performance of Aluminum ladders: Aluminum ladders shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connects and other detrimental effects.
 - 1. Temperature change: 120 degree F, ambient; 180 degree F, material surfaces.

2.2 MATERIALS

- A. General: provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names or blemishes.
- B. Steel Materials:
 - 1. Structural Steel Shapes: ASTM A36/A36M, conforming to AISC specifications.
 - 2. Architectural and Miscellaneous Steel Items: ASTM A283/A283M.
 - 3. Steel Sheets: ASTM A36/A36M.
 - 4. Steel Pipe: ASTM A53/A53M, Grade A, Schedule 40.
 - 5. Steel Tubing: ASTM A500/A500M, Grade A.
 - 6. Steel Plate, Shapes and Bars: ASTM A36/A36M.
 - 7. Galvanized Steel: ASTM A653/A653M, with minimum G90 (Z275) coating unless noted otherwise.
- C. Review dissimilar metals for potential galvanic action. Ensure runoff is directed or diverted so as to prevent water from passing over or across dissimilar metals.

2.3 ROUGH HARDWARE

- A. Gates: ASTM A653/A653M; extra heavy-duty perforated metal.
 - 1. Thickness: 18 gage minimum.
 - 2. Finish: G90 hot-dip-galvanized, painted
 - 3. Furnish with flush end closure treatment top and bottom, reinforced as required for finish hardware
- B. Gate Hardware Components:
 - 1. Hinges: ball-bearing barrel hinges
 - 2. Cane bolts: provide at each leaf of gate; heavy duty cane bolt with brackets, 18-inches long
 - 3. Gate padlock hasp and Drop Bar: cast or formed metal of the same type material and finish as gate

2.4 STEEL LADDERS

- A. General: Fabricate ladders for the locations shown, with dimensions, spacings, details and anchorages as indicated. Comply with requirements of ANSI A14.3 and CFR 29 1910.27; where conflicts occur, comply with the more stringent requirements.
- B. Steel Ladders:
 - 1. Space siderails 18 inches (457 mm) apart, unless otherwise indicated.

2. Siderails: Continuous, 1/2-by-2-1/2-inch (12.7-by-64-mm) steel flat bars, with eased edges.
 3. Rungs: 3/4-inch- (19-mm-) diameter steel bars spaced no greater than 12-inches (305 mm) oc and uniform throughout the length of the ladder.
 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
 5. Provide non-slip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
 6. Individual metal rungs embedded in concrete which serve as access to pits and other areas under floors, must have a minimum diameter of 1-inch (25 mm).
 7. Galvanize pit ladder, including brackets and fasteners.
- C. Support each ladder at top and bottom and at intermediate points spaced not more than 5'-0" (1.5 m) oc by means of welded or bolted brackets made from same metal as ladder, unless otherwise indicated.
1. Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7-inches (178 mm).
 2. Extend side rails 42-inches (1.1 m) above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent structure does not extend above the top rung, gooseneck the extended rails back to the structure to provide secure ladder access.

2.5 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required.

2.6 LOOSE STEEL LINTELS

- A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for opening and recesses in masonry walls and partitions at locations indicated.
- B. Weld adjoining members together to form a single unit where indicated.
- C. Size loose lintels for equal bearing of 1-inch per foot of clear span but not less than 8-inches (203 mm) bearing at each side of openings, unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING, SUPPORTS AND TRIM

- A. Miscellaneous Framing and Supports: Provide steel framing and supports for applications indicated which are not a part of structural steel framework, as required to complete work.
1. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 2. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

- a. Except as otherwise indicated, space anchors 24-inches (61 cm) oc and provide minimum anchor units in the form of steel straps 1-1/4" wide x 1/4" x 8" long (31.8 mm x 6.4 mm x 203 mm).
- B. Miscellaneous Steel Trim: Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination for assembly and installation with other work.
- C. Fabricate supports for operable partition from continuous steel beams of size recommend by operable partition manufacturer with attached bearing plates, anchors and braces as recommended by partition manufacturer. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition shop drawings, where approved by structural engineer.

2.8 SHELF AND LEDGER ANGLES

- A. Fabricate shelf and ledger angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19.1 mm) bolts, spaced not more than 6-inches (152 mm) from ends and not more than 24-inches (0.61 m) oc, unless otherwise indicated.
- B. Furnish wedge-type concrete inserts, complete with fasteners, for attachment of shelf angles to cast-in-place concrete.

2.9 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe, concrete filled.
 - 1. Size: 6-inch diameter by 48-inch above finished grade.
- B. Galvanize metal bollards after fabrication.

2.10 SPECIALTY FABRICATED PRODUCTS

- A. Preparation:
 - 1. Coordinate with other work supporting or adjoining miscellaneous metal and verify requirements for cutting out, fitting, and attaching.
 - 2. Verify sizes, designs, and locations of items; do so at site whenever construction progress permits.
- B. General Requirements:
 - 1. Fabricate items from materials noted and make true to profiles shown. Obtain the Architect's and Owner's approval of proposed variations.
 - 2. Miter corners and angles of frames and moldings unless otherwise noted.
 - 3. Perform cutting, shearing, drilling, punching, threading, tapping as required for items or their adjacent work.
 - 4. Drill or punch holes; do not use cutting torch.
 - 5. Ensure shearing and punching leaves true lines and surfaces.
 - 6. Items to be Galvanized: Fabricate in accordance with recommended practices of ASTM A385/A385M and A123/A123M unless specifically noted otherwise.

7. Fabricate exterior items for assembly and installation on site without field welding of joint.
 8. Ensure metal thickness and assembly details provide ample strength and stiffness.
 9. Size sleeves for approximately 1/4-inch clearance all around.
- C. Fastening:
1. Provide fasteners and anchor assemblies required for complete fabrication, field assembly, and erection.
 2. Conceal fastenings wherever practicable.
 3. Size internally threaded diameters to accommodate galvanized threaded bolts where galvanizing is required.
 4. Permanent connections in Ferrous Metal Items: Employ welding wherever practicable; avoid bolts and screws.
- D. Welding:
1. Use electric shielded-arc process according to AWS D1.1.
 2. Maintain shape and profile of item welded.
 3. Prevent heat blisters, run-throughs, and surface distortions.
 4. Welds Normally Exposed to View in Finished Work: Make uniform and grind smooth.
 5. Exposed Welds: Remove burrs, flux, welding oxide, air spots and discoloration; grind smooth, polish, or otherwise finish to match material welded.
- E. Bolted and Screwed Connections:
1. Use bolts for field connections only, and then only as noted. Countersink heads; finish smooth and flush.
 2. Provide washers under heads and nuts bearing on wood.
 3. Draw nuts tight and prevent loosening of permanent connections by nicking threads.
 4. Use beveled washers where bearing is on sloped surfaces.
 5. Where necessary to use screws for permanent connections in ferrous metal, use flat head type, countersink, fill screw slots, and finish smooth and flush.
 6. Evenly space exposed heads.
- 2.11 ACCESSORIES
- A. General: Provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade and class required.
- B. Typical Unfinished Bolts, Nuts, and Washers: Low carbon steel standard fasteners, externally and internally threaded, ASTM A307 Grade A; malleable washers.
- C. Expansion Bolts: FS FF-S-325, Group II, Type 4.
- D. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
- E. Washers: ANSI B18.22.1; flat round washers.

- F. Anchor Bolts: ASTM F1554, Grade 36.
- G. Grout: Non-shrink, non-metallic grout, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- H. Concrete Fill: Comply with requirements in Section 03 30 00 for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.
- I. Primer: Zinc-chromate type.
- J. Zinc for Galvanizing: ASTM B6.
- K. Welding Electrodes: E-70XX.

2.12 PRIMER FINISHES

- A. Preparations of Surfaces:
 - 1. Thoroughly clean ungalvanized ferrous-metal surfaces of mill scale, rust, dirt, grease, oil, and other foreign matter from ferrous metal prior to galvanizing, hot phosphate treatment or painting.
 - a. Use solvent or mechanical cleaning methods that comply with SSPC recommendations.
 - 2. Where hand-cleaning methods are not adequate, and unless specified otherwise, clean in accordance with SSPC-SP 1, SSPC-SP 2, or SSPC-SP 7 as required.
 - 3. Completely eliminate burrs, rough spots and pitting from normally exposed ferrous metal items.
 - 4. AESS Surface Preparation: Blast-clean ungalvanized steel surfaces as recommended by coating manufacturer and according to SSPC-SP 6 minimum in preparation for galvanizing.
 - 5. Galvanized Steel: Remove oil or soap film with detergent or emulsion cleaner. Lightly abrasive-blast with a fine abrasive in accordance with SSPC SP-16 guidelines to achieve a profile of 1.5-3.0 mils. When light abrasive blasting is not possible, galvanizing can be treated with a suitable zinc phosphate conversion coating.
 - a. Galvanizing that has at least 12 months of exterior weathering and has a rough surface with whit rust present may be over-coated after power washing and cleaning to remove white rust and other contaminates. The surface must have a measurable profile.
 - b. Prepare a test patch to confirm adhesion. Do not use over chromate sealed galvanizing without blasting to thoroughly remove chromates.
- B. Galvanizing:
 - 1. Galvanize items after fabrication in largest sections practicable unless otherwise permitted or recommended by ASTM A384/A384M and A385/A385M.
 - 2. Where galvanizing is removed by welding or other assembly procedures, touch up abraded areas with molten zinc or zinc-rich paint.
 - 3. Where ferrous metal item is noted to be galvanized, perform galvanizing in accordance with following standards as applicable to item, using a minimum of 2.0 ounces per square foot:

- a. Hardware Items Including Fasteners: ASTM A153/A153M.
 - b. Items Both under 1/8-inch Thickness and Fabricated from Rolled, Pressed, and Forged Shapes, Plates, Bars, and Strips: ASTM A123/A123M.
 - c. Other Fabricated Items: ASTM A123/A123M.
- C. Finish Schedule: Unless noted otherwise in Materials or Standard Catalog Products Articles.
1. Ferrous Metal, Interior Items:
 - a. Concealed: Clean, chemically etch, and shop-apply one prime-coat.
 - b. Exposed and AESS: Clean, treat with hot phosphate, chemically etch, and shop-apply one prime-coat.
 2. Ferrous Metal, Exterior Items:
 - a. Concealed: Clean and hot-dip galvanize in accordance with galvanizing standards.
 - b. Exposed and AESS: Clean, then hot-dip galvanize in accordance with galvanizing standards, chemically etch, and shop- apply one prime-coat.
 3. Special Ferrous Metal Items as Noted Below: Clean and hot-dip galvanize in accordance with galvanizing standards. Do not prime coat.
 4. Items Noted as Chrome-Plated: Same as US26D finish.
 5. Hardware Including Fasteners (Bolts, Nuts, Washers, Etc.):
 - a. Finish to match items fastened.
 - b. Where galvanizing is required, hot-dip galvanize according to ASTM A153/A153M.

2.13 SOURCE QUALITY CONTROL

- A. Test and Inspections: The Owner will engage a testing laboratory to inspect welds per 2016 CBC Chapter 17A, AISC 360, and AISC 341.

PART 3 - EXECUTION – NOT USED

END OF SECTION 05 50 00

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SECTION 05 53 00 – METAL GRATINGS

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 SECTION INCLUDES

- A. Metal bar gratings.

1.3 QUALITY ASSURANCE

- A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual" and NAAMM MBG 532, "Heavy-Duty Metal Bar Grating Manual."
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."

1.4 SITE CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Provide allowance for trimming and fitting at site.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Gratings: Provide gratings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Floors: Uniform load of 75 lbf/sq. ft. (3.59 kN/sq. m) or concentrated load of 2000 lbf (8.90 kN), whichever produces the greater stress.
 - 2. Floors: Uniform load of 125 lbf/sq. ft. (6.00 kN/sq. m) or concentrated load of 3000 lbf (13.40 kN), whichever produces the greater stress.
 - 3. Walkways and Elevated Platforms Other Than Exits: Uniform load of 60 lbf/sq. ft. (2.87 kN/sq. m).
 - 4. Limit deflection to L/240 or 1/4 inch (6.4 mm), whichever is less.
- B. Seismic Performance: Provide gratings capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

2.2 FERROUS METALS

- A. Grating:
 - 1. Basis-of-Design Product: Omega 10 Orsogril.
 - 2. Color: Match window mullions.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Wire Rod for Grating Crossbars: ASTM A510/A510M.
- D. Galvanized Steel Sheet: ASTM A653/A653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).
- C. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).
- D. Anchors: Provide cast-in-place or torque-controlled expansion anchors with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E488/E488M conducted by a qualified independent testing agency.
 - 1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633, Class Fe/Zn 5.
 - 2. Material for Anchors in Exterior Locations: Alloy Group 1 (A1) stainless-steel bolts complying with ASTM F593 (ASTM F738M) and nuts complying with ASTM F594 (ASTM F836M).

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy that is welded.
- B. Zinc-Rich Primer: Zinc-rich primer, complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.5 FABRICATION

- A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

- B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- D. Fit exposed connections accurately together to form hairline joints.
- E. Welding: Comply with AWS recommendations and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
- F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

2.6 METAL BAR GRATINGS

- A. Welded Steel Grating:
 - 1. Bearing Bar Spacing: 1/2oc.
 - 2. Bearing Bar Depth: 1-inch
 - 3. Bearing Bar Thickness: 3/16 inch (4.8 mm).
 - 4. Final Finish: Painted.
 - a. Color: Match Architect's sample approved by Owner.
- B. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.
 - 1. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.
- C. Do not notch bearing bars at supports to maintain elevation.

2.7 GRATING FRAMES AND SUPPORTS

- A. Frames and Supports for Metal Gratings: Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.
 - 1. Unless otherwise indicated, fabricate from same basic metal as gratings.
 - 2. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches (600 mm) o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 05 53 00

SECTION 05 73 13 – GLAZED DECORATIVE METAL RAILINGS

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 SECTION INCLUDES

- A. Glazed decorative metal guardrails and handrails along the Community Hall Platform ramp and steps

1.3 DEFINITIONS

- A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas, pedestrian guidance and support, visual separation, or wall protection.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm experienced in successfully producing metal fabrications similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the work.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of handrails and railings that are similar to those indicated for this Project in material, design, and extent.
- C. Handrails and railings shall comply with ADA requirements and California Building Code (CBC) 11B-505.
- D. Source Limitations: Obtain each type of railing through one source from a single manufacturer.
- E. Product Options: Drawings indicate size, profiles, and dimensional requirements of railings and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
 - 1. Do not modify intended aesthetic effects, except with Architect's and Owner's approval. If modifications are proposed, submit comprehensive explanatory data to Architect and Owner for review.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - 1. Stainless Steel: 60 percent of minimum yield strength.
 - 2. Steel: 72 percent of minimum yield strength.
 - 3. Glass: 25 percent of mean modulus of rupture (50 percent probability of breakage), as listed in "Mechanical Properties" in AAMA's Aluminum Curtain Wall Series No. 12, "Structural Properties of Glass."
- B. Structural Performance: Provide handrails and guards complying with CBC 1607.7 that are capable of withstanding the effects of gravity loads at any point without damage or permanent set for railing assemblies, wall rails, and attachments, and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails:
 - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Glass-Supported Railings: Support each section of top rail by a minimum of three glass panels or by other means so top rail will remain in place if any one panel fails.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

2.2 MATERIALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails, unless otherwise indicated.
 - 1. Provide cast-metal brackets with flange tapped for concealed anchorage to threaded hanger bolt.

2.3 STAINLESS STEEL

- A. Castings: ASTM A743/A743M, Grade CF 8 or CF 20.
- B. Tubing: ASTM A554, Grade MT 304.
- C. Pipe: ASTM A312/A312M, Grade TP 304.

2.4 GLASS AND GLAZING MATERIALS

- A. Laminated Glass: ASTM C1172, Condition A (uncoated), Type I (transparent flat glass), Quality-Q3 with clear, polyvinyl butyral interlayer not less than 0.060 inch (1.52 mm) thick.
 - 1. Kind: LT (laminated tempered).
 - 2. Clear Glass: Class 1 (clear).
 - 3. Lites for Structural Glass Balusters: Two, each of thickness required by structural loads, but not less than 6.0 mm thick.
- B. Glazing Cement and Accessories for Structural Glazing: Provide glazing cement, setting blocks, shims, and related accessories as recommended or supplied by railing manufacturer for installing structural glazing in metal subrails.
 - 1. Glazing Cement: Provide nonshrinking organic cement designed for curing by passing an electric current through metal subrail holding glass panel, as standard with manufacturer.

2.5 FASTENERS

- A. General: Provide the following:
 - 1. Stainless-Steel Components: Type 304 stainless-steel fasteners.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

2.6 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Form work true to line and level with accurate angles and surfaces.
- D. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- E. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- F. Form changes in direction as follows:
 - 1. As detailed.
- G. Provide returns at ends of handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.

2.7 GLAZING PANEL FABRICATION

- A. General: Fabricate to sizes and shapes required; provide for proper edge clearance and bite on glazing panels.
- B. Apply etching on glass to comply with GANA's "Engineering Standards Manual."
- C. Structural Balusters: Provide laminated, tempered glass panels for all sections.
- D. Drill holes for connectors in glass prior to heat treating or tempering.
- E. Clean-cut or flat-grind vertical edges of monolithic lites in a manner that produces square edges with slight kerfs. Grind smooth and polish exposed glass edges.

2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

2.9 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.
- B. Grind and polish surfaces to produce uniform finish indicated, free of cross scratches.
 - 1. Run grain of directionally textured finishes with long dimension of each piece.
- C. Directional Satin Finish: No. 4.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 05 73 13

SECTION 06 10 53 – MISCELLANEOUS ROUGH CARPENTRY

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 SECTION INCLUDES

- A. Wood blocking, cants, and nailers.
- B. Wood furring and grounds.
- C. Plywood backing panels.
- D. Supplementary components and accessories normally furnished or necessary for a complete installation, whether or not such items are indicated in the Drawings or included in the Specifications.

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2-inches nominal (38 mm actual) or greater but less than 5-inches nominal (114 mm actual) in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NLGA - National Lumber Grades Authority.
 - 2. WCLIB: West Coast Lumber Inspection Bureau.
 - 3. WWPA: Western Wood Products Association.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Forest Certification: Provide components made with not less than 50 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
 - 1. Dimension lumber framing.
 - 2. Miscellaneous lumber.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-

writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

B. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

C. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.

2.2 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.

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

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

1. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.

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

1. Western woods, Standard or No. 3 Common grade; WCLIB or WWPA.

E. For blocking not used for attachment of other construction Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

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

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

2.3 PLYWOOD BACKING PANELS

- A. Telecommunications and Electrical Equipment Backing Panels: AWP Standard C27 for Type A use and Standard DB-90 free from defects, fire-retardant treated and bearing the Underwriters Laboratories label, or stamp, attesting to the FRS rating, in size indicated or, if not indicated, not less than 8' by 4' by 3/4-inch nominal.
 - 1. Provide kiln-dried plywood with maximum moisture content of 15 percent or less.
 - 2. Underwriters Laboratories FRS Rating:
 - a. Surface-Burning Characteristics: ASTM E84.
 - 1) Flame-Spread Index: 25 or less.
 - 2) Smoke Developed: 25 or less.
 - 3. The fire retardant chemicals used shall be halogen and sulfate free.
 - 4. Provide plywood that meets the surface burning characteristics testing requirements of NFPA 255.
 - 5. Do not paint backing panels unless approved by authorities having jurisdiction. Mask UL markings so that they remain visible after painting is complete.

2.4 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Treatment shall not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat all rough carpentry unless otherwise indicated.

2.5 FASTENERS

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

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails: ASTM F1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- G. Bolts: Steel bolts complying with ASTM A307, Grade A (ASTM A153/A153M, Property Class 4.6); with ASTM A563 hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E488/E488M conducted by a qualified independent testing and inspecting agency.

2.6 METAL FRAMING ANCHORS

- A. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 (Z180) coating designation.
 1. Use for interior locations where stainless steel is not indicated.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 06 10 53

SECTION 06 41 00 – ARCHITECTURAL WOODWORK

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 SECTION INCLUDES

- A. Custom work counters, base and upper wall cabinets, tall cabinets, cubbies, as indicated in Design Criteria Documents

1.3 RELATED SECTIONS

- A. Section 12 36 40 – Countertops.

1.4 DEFINITIONS

- A. Exposed surfaces include all surfaces visible when:
 - 1. Drawers and opaque doors (if any) are closed.
 - 2. Areas behind clear glass doors.
 - 3. Bottoms of cabinets 42-inches or more above finished floor.
 - 4. Top of cabinets below 78-inches above finished floor.
- B. Semi-exposed surfaces include the following:
 - 1. Open opaque doors or extended drawers.
 - 2. Bottoms of cabinets that are more than 30-inches and less than 42-inches above finished floor.
- C. Concealed surfaces include the following:
 - 1. Surfaces not visible after installation.
 - 2. Bottoms of cabinets less than 30-inches above finished floor.
 - 3. Tops of cabinets over 78-inches above finish floor and not visible from an upper level.
 - 4. Stretchers, blocking, and components concealed by drawers.
- D. Woodwork Quality Standard Compliance Certificates: WI-certified compliance certificates.

1.5 QUALITY CONTROL

- A. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers.
- B. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

- C. Forest Certification: Provide components made with not less than 50 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- D. NAAWS Quality Standard: Comply with the specified grade(s) of interior architectural woodwork indicated for construction, finishes, and installation, specified section(s), and applicable requirements of the current edition of the "North American Architectural Woodwork Standards – 3.0, United States Version".
 - 1. Provide WI-certified compliance labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of NAAWS's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Hardwood and Softwood Lumber: Custom graded in accordance with NAAWS; average moisture content of 8 percent.
 - 1. Species: Any closed-grain hardwood. For use at concealed areas only.
- C. Hardwood Plywood: ANSI/HPVA HP-1; veneer core material; type of glue recommended for application.
 - 1. Formaldehyde Emission Levels: No urea formaldehyde.
 - 2. Wood Veneer Species and Cut for Casework: White maple, plain sawn or sliced.
 - 3. Face Grade: Grade A.
 - 4. Thickness: 3/4-inch.
 - 5. Veneer Core: 5-ply.
 - 6. Cut: Sliced-vertical grain.
 - 7. Back Grade: Minimum Grade 2.
- D. Plywood Subtops for Countertops: Meeting APA requirements and the following:
 - 1. Exposure: Exterior.
 - 2. Thickness: 3/4-inch minimum.
 - 3. Grade: APA A-A, EXT-APA, Group1, Package 2: Bid Set - January 16, 2020.
 - 4. Treat any exposed edges with exterior paint primer designed for use on plywood.
 - 5. Paint any exposed surfaces as indicated in Section 099100.
- E. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.
 - 1. Acceptable Products: SierraPine's "Medex," "Medex NC," and "Medite II" and Weyerhaeuser's "Premier Plus".
 - 2. Composite wood products shall comply with the California Air Resources Board (CARB) Airborne Toxic Control Measure (ATCM) to Reduce Formaldehyde Emissions from Composite Wood Products (Sections 93120-93120.12, Title 17, California Code of Regulations.
- F. Cabinet Interiors, Shelves, and Counter Substrate: 3/4-inch Medite II, interior grade wood-based composite panels manufactured from softwood fibers with minimum 90% pre-

consumer recycled wood combined with formaldehyde-free synthetic resin, with clear sealer.

- G. Wood Particleboard: Not Permitted
- H. Thermoset Decorative Panels (Melamine): MDF as specified, finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
 - 1. Provide polyester edge banding complying with LMA EDG-1 on components with exposed or semiexposed edges.
 - 2. Color: White, unless indicated otherwise on Drawings.
- I. Adhesive: FS MMM-A-130 contact adhesive; type recommended by laminate manufacturer to suit application.
 - 1. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Wood Glues: 30 g/L.
 - b. Contact Adhesive: 50 g/L.
- J. Bolts, Nuts, Washers, Lags, Pins, Fasteners, and Screws: Of size and type to suit application.

2.2 CUSTOM CASEWORK FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- D. Fabricate woodwork to dimensions, profiles, and details indicated.
- E. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- F. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates

or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

2.3 WOOD CABINET CONSTRUCTION

A. NAAWS Requirements:

1. Quality Standard: Comply with NAAWS Section 10.
2. Grade: Custom.
3. Material: Veneer plywood, White Maple, stained.
4. Construction Style: Type A Frameless.
5. Construction Type: Type II single-length sections to fit across openings.
6. Drawer Front Style: Flush overlay.
 - a. Grain Direction: Vertically for drawer fronts, doors, and fixed panels.
 - b. Matching of Veneer Leaves: Slip match.
 - c. Finish: Clear satin finish

B. Semiexposed Surfaces: Provide surface materials indicated below:

1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
2. Drawer Sides and Backs: Hardwood.
3. Drawer Bottoms: Hardwood.

C. Countertop Support: 3/4-inch plywood

D. Edge Material: Same as cladding on faces.

E. Cabinet Hardware: ANSI/BHMA A156.9, see schedule at end of this Section.

2.4 SHOP FINISHING, WOOD CABINETS

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

B. Grade: Provide finishes of same grades as items to be finished.

1. Finish interior of wood cabinets to match exterior.

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

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.
2. Remove handling marks or effects of exposure to moisture from all exposed portions of woodwork by means of a thorough, final sanding over all surfaces of the exposed portions, using appropriate grit sandpaper and clean before applying sealer or finish.

D. Transparent Finish:

1. Grade: Custom.
2. NAAWS Finish System 3: Score 124-T, lacquer post-catalyzed.

3. Staining: Match approved sample for color.
4. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D523.

2.5 HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Section 08 71 00. Where manufacturer's name or product number is not indicated provide best quality commercially available cabinet hardware. All doors and drawers to be lockable.
- B. Cabinet Shelf Pilaster Standards and Rests: BHMA A156.9, all components steel, B04071; with shelf rests, B04081:
 1. Heavy-Duty Pilaster Standards: KV 255 Series., Sugatsune SPE-1820 or City approved equal.
 2. Shelf Rests: KV 237., Sugatsune SPF-20 or City approved equal.
- C. Adjustable Shelving Brackets and Standards: for 14-inch shelves:
 1. Heavy-Duty Pilaster Standards: KV 85 Series, Sugatsune SPE-1820 or City approved equal..
 2. Heavy-Duty Brackets: KV 183.Sugatsune, SPB-200 or City approved equal..
- D. Heavy Weight Drawer Slides: BHMA A156.9, B05091: KV 8805., Accuride 3640A.
 1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-overtravel-extension type; zinc-plated steel ball-bearing slides.
 2. Full extension slides with 1-inch overtravel, side-mount,
 - a. General Purpose Drawers: 200 lb capacity.
 3. Size slides in accordance with manufacturer's recommendations for drawer width.
- E. Drawer and Door Pulls:
 1. Back-Mounted Pulls: BHMA A156.9, B02011.
 2. Wire Pulls: Back mounted, solid metal, 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter, and: 1-1/4" (32mm) projection.
- F. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing: Blum BLUMOTION, Hafele.
 1. Provide three hinges for doors over 48 inches in height.
- G. Grommets for Cable Passage through Countertops: 2-inch (51-mm) OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
- H. Door Locks: BHMA A156.11, E07121.
- I. Drawer Locks: BHMA A156.11, E07041
- J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 2. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
 3. Satin Stainless Steel: BHMA 630.

- 4. Satin Nickel: BHMA 646 or 670.
- K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 06 41 00

SECTION 06 64 13 – FIBERGLASS REINFORCED PLASTIC PANELS

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 SECTION INCLUDES

- A. Fiberglass reinforced polyester panel system for adhesive mounting, floor to ceiling on walls of kitchen and 8' high at janitor's closets wet walls.
- B. Moldings and joint sealants.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
 - 3. Testing Agency: Acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

- A. General (FRP): Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D5319.
 - 1. Nominal Thickness: Not less than 0.09 inch (2.3 mm).
 - 2. Surface Texture: High-gloss, smooth.
 - 3. Color: As selected from manufacturer's standard selection.
- B. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 - 1. Color: Match panels.
 - 2. Base Molding: Design that simplifies installation and helps seal wall panel system, with factory made corners and splices.
 - 3. Borders: 4-inch (100 mm) wide decorative strips made of same material as panels.
- C. Sealant: Single-component, mildew-resistant, neutral-curing silicone as recommended by panel manufacturer.
 - 1. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Color: Clear.
- D. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.
- E. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.
- F. Adhesive: As recommended by plastic paneling manufacturer.
 1. VOC Content: 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION (NOT USED)

END OF SECTION 06 64 13

SECTION 07 21 00 – BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Insulation in batt form of the following types:
 - 1. Thermal glass fiber insulation.
 - 2. Acoustic glass fiber insulation.
- B. Mineral wool insulation at exterior rainscreen systems (phenolic, ACM, metal wall panels) and above exterior soffit

1.3 RELATED SECTIONS

- A. Section 07 42 10.21 – Continuous Insulation (CI) with Composite Framing Support (CFS) System: Rigid insulation furring system.

1.4 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Provide insulation materials identical to those whose indicated fire performance characteristics have been determined per the ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting organization.
 - 1. Surface Burning Characteristic: ASTM E84.
 - 2. Fire Resistance Ratings: ASTM E119.
 - 3. Combustion Characteristics: ASTM E136.
- B. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Recycled Content: Provide products made from fiberglass batts with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 30 percent.
- B. Insulation Materials: Provide only insulation materials that are GREENGUARD Certified.

- C. Preformed Units: Sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths, and lengths.

2.2 GLASS FIBER INSULATING MATERIALS

- A. Thermal Insulation at Exterior Walls and Soffits: ASTM C665, Type I; preformed glass fiber batts conforming to the following:
 - 1. Type(s): Unfaced Glass-Fiber Blanket: Type I.
 - 2. Batt Width: Maximum width as required for application.
 - 3. Flame Spread Rating: Less than 25, as tested in accordance with ASTM E84.
 - 4. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
 - a. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 - b. Low Emitting: Insulation tested according to ASTM D5116 and shown to emit less than 0.05-ppm formaldehyde.
 - 5. Required R-Value: R-19, effective R7.1 for 2x6 metal studs @ 16"o.c. (or as required for wall assembly to achieve min. R-19 value)
- B. Insulation for Sound Attenuation: ASTM C665; Type I preformed glass fiber batts conforming to the following:
 - 1. Batt Width: Maximum width as required for application.
 - 2. Thickness: Fill stud cavity.
 - 3. Facing: Unfaced.
 - 4. Flame Spread Rating: Less than 25, as tested in accordance with ASTM E84.
 - 5. Smoke Developed: Less than 50, as tested in accordance with ASTM E84.
 - 6. Overall Sound Transmission: STC 50.
 - 7. Minimum density of 6 lb/cu ft (96 kg/cu m), thermal resistivity of 4.5 deg F x h x sq ft/Btu x in. at 75 deg F (31.2 K x m/W at 24 deg C).

2.3 MINERAL-WOOL BOARD INSULATION

- A. Rigid Mineral Wool Insulation Board: Rigid mineral wool, non-structural insulated sheathing board.
 - 1. Basis-of-Design Product: ThermaFiber RainBarrier 45
 - 2. Density: 11 pcf.
 - 3. R-Value: ASTM C518; R-4.3 per inch minimum.
 - 4. Thickness: 3 inches thick, or as otherwise indicated, whichever is more stringent.
 - 5. Fire Rating: ASTM E84:
 - a. Flame Spread: 0
 - b. Smoke Developed: 0
 - c. ASTM E136 Rated Non-combustible per NFPA Standard 220
 - 6. Type: ASTM C665 Non-corrosive, Type I, III.
 - 7. Type: ASTM C612 Type IVB compliant.
 - 8. Facing: ASTM E96/E96M Unfaced, 50 Perms as tested
 - 9. Moisture Absorption: ASTM C1104/C1104M Absorbs 0.03% by volume
 - 10. Linear Shrinkage: ASTM C356 Linear Shrinkage <2% 1200° F (650° C)
- B. EXECUTION (NOT USED)

END OF SECTION 07 21 00

SECTION 07 24 13 – POLYMER-BASED EXTERIOR INSULATION
AND FINISH SYSTEM (EIFS)

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 SECTION INCLUDES

- A. Exterior insulation and finish system (EIFS) applied over exterior gypsum sheathing.

1.3 QUALIFICATIONS

- A. Installer Qualifications: An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers.
- B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with system components.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution and set quality standards for fabrication and installation.
 - 1. Construct mock-up of suitable size as directed by Architect and as required to accurately represent the products being installed, as well as each color and texture to be utilized on the project.
 - 2. EIFS mock-up to include adjoining materials to demonstrate terminations and interfaces with project specific conditions, assemblies and systems.
 - 3. Prepare mock-up with the same products, tools, equipment and techniques required for the actual applications and employing same workers who will install the system. The finish used shall be from the same batch that is being used on the project.
 - 4. The approved mock-up shall be available and maintained at the jobsite.
 - 5. Approved mockups may become part of the completed Work if undisturbed at time of Project Acceptance.
- D. Preinstallation Conference: Conduct conference at Project site.

1.4 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of EIFS that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Bond integrity and weathertightness.
 - b. Deterioration of EIFS finishes and other EIFS materials beyond normal weathering.
 - 2. Warranty coverage includes the following EIFS components:

- a. EIFS finish, including base coats, finish coats, and reinforcing mesh.
 - b. Insulation installed as part of EIFS.
 - c. Insulation adhesive and mechanical fasteners.
 - d. EIFS accessories, including trim components and flashing.
3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Class PB EIFS: A non-load-bearing, exterior wall cladding system that consists of an insulation board attached adhesively, mechanically, or both to the substrate; an integrally reinforced base coat; and a textured protective finish coat.
- B. EIFS Performance: Comply with ASTM E2568 and:
 1. Bond Integrity: Free from bond failure within EIFS components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
 2. Weathertightness: Resistant to water penetration from exterior into EIFS and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of EIFS and assemblies behind it, including substrates, supporting wall construction, and interior finish.
 3. System Fire Performance: Fire-resistance rating of wall assembly.
- C. Class PB EIFS: Provide EIFS having physical properties and structural performance that comply with the following:
 1. Absorption-Freeze Resistance: No visible deleterious effects and negligible weight loss after 60 cycles per EIMA 101.01.
 2. Accelerated Weathering: Five samples per ICC-ES AC219 showing no cracking, checking, crazing, erosion, rusting, blistering, peeling, delamination, or other characteristics that might affect performance as a wall cladding after testing for 2000 hours when viewed under 5 times magnification per ASTM G153 or ASTM G154.
 3. Mildew Resistance of Finish Coat: Sample applied to 2-by-2-inch (50.8-by-50.8-mm) clean glass substrate, cured for 28 days, and showing no growth when tested per ASTM D3273 and evaluated according to ASTM D3274.
 4. Tensile Adhesion: No failure in the EIFS, adhesive, base coat, or finish coat when tested per EIMA 101.03.
 5. Water Penetration: Sample consisting of 1-inch- (25.4-mm-) thick EIFS mounted on 1/2-inch- (12.7-mm-) thick gypsum board, cured for 28 days, and showing no water penetration into the plane of the base coat to expanded-polystyrene board interface of the test specimen after 15 minutes at 6.24 lbf/sq. ft. (299 Pa) of air pressure difference or 20 percent of positive design wind pressure, whichever is greater, across the specimen during a test period when tested per EIMA 101.02.
 6. Water Resistance: Three samples, each consisting of 1-inch- (25.4-mm-) thick EIFS mounted on 1/2-inch- (12.7-mm-) thick gypsum board; cured for 28 days; and showing no cracking, checking, crazing, erosion, rusting, blistering, peeling, or delamination after testing for 14 days per ASTM D2247.

2.2 MANUFACTURERS

- A. Basis of Design: Dryvit Systems Outsulation Plus MD System, Finesse texture, Color: “105 Suede”

2.3 SYSTEM DESCRIPTION

- A. General: Exterior Insulation and Finish System (EIFS), Class PB, consisting of an air/water-resistive barrier, accessoran adhesive, grooved expanded polystyrene insulation board, internal vinyl tracks vent assembly, starter strips, base coat, reinforcing mesh(es) and finish.
- B. Methods of Installation: Field applied to the substrate, system in place.
- C. Design Requirements:
 - 1. Acceptable substrates:
 - a. Exterior sheathing having a water-resistant core with fiberglass mat facers meeting ASTM C1177.
 - b. Concrete.
 - 2. Deflection of the substrate systems shall not exceed 1/240 times the span.
 - 3. The substrate shall be flat within 6.4 mm (1/4 in) in a 1.2 m (4 ft) radius.
 - 4. The slope of inclined surfaces shall not be less than 6:12 (27°) and the length shall not exceed 305 mm (12 in).
 - 5. All areas requiring an impact resistance classification higher than "standard", as defined by ASTM E2486 (formerly EIMA Standard 101.86), shall be as detailed in the drawings and described in the contract documents.
- D. Expansion Joints: See manufacturer’s written instructions.
 - 1. Design and location of expansion joints in the EIFS system are as indicated on the Drawings. As a minimum, expansion joints shall be placed at the following locations:
 - a. Where expansion joints occur in the substrate system.
 - b. Where building expansion joints occur.
 - c. At floor lines in wood frame construction.
 - d. At floor lines of non-wood framed buildings where significant movement is expected.
 - e. Where the EIFS abuts dissimilar materials.
 - f. Where the substrate type changes.
 - g. Where prefabricated panels abut one another.
 - h. In continuous elevations at intervals not exceeding 23 m (75 ft).
 - i. Where significant structural movement occurs, such as changes in roof line, building shape or structural system.
- E. Terminations: See manufacturer’s written instructions.
 - 1. Prior to applying the EIFS system, wall openings shall be treated with manufacturer’s recommended liquid or tape flashing material.
 - 2. The EIFS system shall be held back from adjoining materials around openings and penetrations such as windows, doors, and mechanical equipment a minimum of 19 mm (3/4 in) for sealant application. Light fixtures, receptacles, hosebibbs, and other sim. wall devices at EIFS requiring 3/4” joint shall visually conceal joint via fixture/device selection and/or oversized cover plate(s). Where multiple devices are

- located adjacent (like multiple power/data devices), provide single face plate for grouping.
3. The system shall be terminated a minimum of 203 mm (8 in) above finished grade.
 4. Sealants:
 - a. Shall be manufactured and supplied by others.
 - b. Shall be compatible with and adhere to the EIFS system materials and any adjacent materials for a complete weatherproof installation. Refer manufacturer's literature for listing of compatible sealants.
 - c. Sealant Backer Rod: Closed cell.
- F. Vapor Retarders: The use and location of vapor retarders within a wall assembly is the responsibility of the project designer and shall comply with 2019 CBC requirements. The type and location are noted on the project drawings and specifications. Vapor retarders may be inappropriate in certain climates and can result in condensation within the wall assembly.
- G. Flashing: Shall be provided at all roof-wall intersections, windows, doors, chimneys, decks, balconies and other areas as necessary to prevent water from entering behind the EIFS system.

2.4 MATERIALS

- A. Compatibility: Provide adhesive, fasteners, board insulation, reinforcing meshes, base- and finish-coat systems, sealants, and accessories that are compatible with one another and with substrates and approved for use by EIFS manufacturer for Project.
- B. Sheathing: ASTM C1177/C1177M, Georgia-Pacific, Dens-Glass Gold, 5/8-inch- thick water-resistant treated gypsum core board with inorganic glass mats both sides and long edges, gold color alkali resistant surface coating, for exterior applications.
- C. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; compatible with substrate; with VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24); and complying with one of the following:
 1. Factory-blended dry formulation of portland cement, dry polymer admixture, and fillers specified for base coat.
 2. Factory-mixed noncementitious formulation designed for adhesive attachment of insulation to substrates of type indicated, as recommended by EIFS manufacturer.
- D. Molded, Rigid Cellular Polystyrene Board Insulation: Comply with ASTM C578, Type I; EIFS manufacturer's requirements; and EIMA's "EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board" for most stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:
 1. Aging: Before cutting and shipping, age insulation in block form by air drying for not less than six weeks or by another method approved by EIMA that produces equivalent results.
 2. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, per ASTM E84.
 3. Dimensions: Provide insulation boards not more than 24 by 48 inches (610 by 1219 mm) and in thickness indicated, but not more than 4 inches (102 mm) thick or less than thickness allowed by ASTM C1397.

4. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. (21 dN/cm) per ASTM E2098/E2098M; complying with ASTM D578/D578M and the following:
- a. Provide for ultra high impact mesh assembly for all EIFS clad wall areas within 8'-0" of grade and where additionally indicated on drawings.

Reinforcing Mesh ¹ /Weight oz/yd ² (g/m ²)	Minimum Tensile Strengths	EIMA Impact Classification	EIMA Impact Range		Impact Test Results	
			in-lbs	(Joules)	in-lbs	(Joules)
Standard - 4.3 (146)	150 lbs/in (27 g/cm)	Standard	25-49	(3-6)	36	(4)
Standard Plus - 6 (203)	200 lbs/in (36 g/cm)	Medium	50-89	(6-10)	56	(6)
Intermediate™ - 12 (407)	300 lbs/in (54 g/cm)	High	90-150	(10-17)	108	(12)
Panzer® 15 ¹ - 15 (509)	400 lbs/in (71 g/cm)	Ultra High	>150	(>17)	162	(18)
Panzer 20 ¹ - 20.5 (695)	550 lbs/in (98 g/cm)	Ultra High	>150	(>17)	352	(40)
Detail Mesh® Short Rolls - 4.3 (146)	150 lbs/in (27 g/cm)	n/a	n/a	n/a	n/a	n/a
Corner Mesh™ - 7.2 (244)	274 lbs/in (49 g/cm)	n/a	n/a	n/a	n/a	n/a
* It shall be colored blue and bear the Dryvit logo for product identification						
1. Shall be used in conjunction with Standard Mesh (recommended for areas exposed to high traffic)						

- E. Base-Coat Materials: EIFS manufacturer's standard mixture complying with one of the following:
1. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.
 2. Factory-mixed noncementitious formulation of polymer-emulsion adhesive and inert fillers that is ready to use without adding other materials.
- F. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
- G. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating complying with the following:
1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
 2. Provide colors and textures selected by Architect and Owner from manufacturer's full range of colors and textures for type of finish coat indicated.
 3. Finish to be smooth 100% acrylic-based dirt pickup resistance finish, integral color and texture, formulated with hydrophobic properties
- H. Water: Potable.

2.5 AIR/MOISTURE BARRIER

- A. See Section 07 27 26.

2.6 ACCESSORIES

- A. Mechanical Fasteners: EIFS manufacturer's standard corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; selected for properties of pullout, tensile, and shear strength required to resist design loads of application indicated; capable of pulling fastener head below surface of insulation board; and of the following description:
 - 1. For attachment to steel studs from 0.033 to 0.112 inch (0.84 to 2.84 mm) in thickness, provide steel drill screws complying with ASTM C954.
 - 2. For attachment to light-gage steel framing members not less than 0.0179 inch (0.45 mm) in thickness, provide steel drill screws complying with ASTM C1002.

- B. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D1784, manufacturer's standard Cell Class for use intended, and ASTM C1063.
 - 1. Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
 - 2. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
 - 3. Expansion Joint: Prefabricated, one-piece V profile; designed to relieve stress of movement.
 - 4. Window Sill Flashing: Prefabricated type for both flashing and sloping sill over framing beneath windows; with end and back dams; designed to direct water to exterior.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of EIFS.
- B. Examine roof edges, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where EIFS will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- B. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind drainage plane of EIFS and deterioration of substrates.

- C. Prepare and clean substrates to comply with EIFS manufacturer's written requirements to obtain optimum bond between substrate and adhesive for insulation.

3.3 INSULATION INSTALLATION

- A. Comply with manufacturer's current published instructions for installation of system as applicable to each type of substrate indicated.
- B. Board Insulation: Adhesively and mechanically attach insulation to substrate in compliance with ASTM C1397, EIFS manufacturer's written instructions, and the following:
 - 1. Apply adhesive to insulation by notched-trowel method in a manner that results in coating the entire surface of sheathing with adhesive once insulation is adhered to sheathing unless EIFS manufacturer's written instructions specify using primer/sealer with ribbon-and-dab method. Apply adhesive to a thickness of not less than 1/4 inch (6.4 mm) for factory mixed and not less than 3/8 inch (9.6 mm) for field mixed, measured from surface of insulation before placement.
 - 2. Press and slide insulation into place. Apply pressure over the entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
 - 3. Allow adhered insulation to remain undisturbed for period recommended by EIFS manufacturer, but not less than 24 hours, before installing mechanical fasteners, beginning rasping and sanding insulation, or applying base coat and reinforcing mesh.
- C. Mechanically attach insulation to substrate by method complying with EIFS manufacturer's written instructions. Install top surface of fastener heads flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:
 - 1. Steel Framing: 5/16 inch (8 mm).
 - 2. Wood Framing: 1 inch (25 mm).
 - 3. Concrete and Masonry: 1 inch (25 mm).
- D. Apply insulation over dry substrates in courses with long edges of boards oriented horizontally.
- E. Begin first course of insulation from a level base line and work upward.
- F. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints so no piece of insulation is less than 12 inches (300 mm) wide or 6 inches (150 mm) high. Offset joints not less than 6 inches (150 mm) from corners of window and door openings and not less than 4 inches (100 mm) from aesthetic reveals.
 - 1. Adhesive Attachment: Offset joints of insulation not less than 6 inches (150 mm) from horizontal and 4 inches (100 mm) from vertical joints in sheathing.
 - 2. Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.
- G. Interlock ends at internal and external corners.
- H. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than 1/16 inch (1.6 mm) occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.

- I. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
- J. Allow adhered insulation to remain undisturbed for not less than 24 hours prior to beginning rasping and sanding insulation or application of base coat and reinforcing fabric.
- K. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/16 inch (1.6 mm) from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch (1.6 mm).
- L. Install foam shapes and attach to sheathing structure.
- M. Offset joints of insulation at least 4-inches (100 mm) from joints in sheathing. Interlock ends at internal and external corners.
- N. Rasp or sand flush entire surface of insulation. Remove irregularities projecting more than 1/32-inch (0.8 mm) and yellowed areas due to sun exposure. Do not create depressions deeper than 1/16-inch (1.6 mm).
- O. Interrupt insulation where expansion joints are indicated in substrates behind exterior insulation and finish systems.
- P. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
- Q. After installing insulation and before applying reinforcing mesh, fully wrap board edges with strip reinforcing mesh. Cover edges of board and extend encapsulating mesh not less than 2-1/2 inches (64 mm) over front and back face unless otherwise indicated on Drawings.
- R. Treat exposed edges of insulation as follows:
 - 1. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
 - 2. Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
- S. Expansion Joints: Install at locations indicated, where required by EIFS manufacturer, and as follows:
 - 1. At expansion joints in substrates behind EIFS.
 - 2. Where EIFS adjoin dissimilar substrates, materials, and construction, including other EIFS.
 - 3. At floor lines in multilevel wood-framed construction.
 - 4. Where wall height or building shape changes.
 - 5. Where EIFS manufacturer requires joints in long continuous elevations.
 - 6. Where panels abut one another.
- T. Coordinate flashing installation with installation of insulation.

3.4 BASE COAT INSTALLATION

- A. Base Coat: Apply to exposed surfaces of insulation in minimum thickness recommended in writing by EIFS manufacturer, but not less than 1/16-inch (1.6-mm) dry-coat thickness.
- B. Reinforcing Mesh: Embed type indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than 2-1/2 inches (64 mm) or otherwise treated at joints to comply with ASTM C1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches (204 mm) of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.
 - 1. Use standard reinforcing mesh.
 - 2. Intermediate-impact reinforcing mesh where indicated on Drawings.
 - 3. High-impact-resistant reinforcing mesh at high-impact areas indicated on Drawings.
 - 4. Heavy-duty reinforcing mesh where indicated on Drawings.
- C. Ultra-High impact mesh application (recommended to a minimum height of 6'-0" [1.8 m] above finished grade extended up to the nearest break, joint, or reveal, at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact, where recommended by manufacturer, and where indicated on contract drawings): apply base coat over the insulation board with a stainless steel trowel to a uniform thickness of approximately 1/8 inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016 mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Butt ultra-high impact mesh at seams. Allow the base coat to dry.
- D. Additional Reinforcing Mesh:
 - 1. Apply strip reinforcing fabric around openings extending 4-inches (100 mm) beyond perimeter.
 - 2. Apply additional 9-by-12-inch (230-by-300-mm) strip reinforcing mesh diagonally at corners of openings (re-entrant corners).
 - 3. Apply 8-inch- (200-mm-) wide strip reinforcing at both inside and outside corners unless base layer of fabric is lapped at least 4-inches (100 mm) on each side of corners.
 - 4. Embed strip reinforcing mesh in base coat before applying first layer of reinforcing mesh.

3.5 FINISH-COAT INSTALLATION

- A. Primer: Apply over dry base coat according to EIFS manufacturer's written instructions.
- B. Finish Coat: Apply over dry primed base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
 - 1. Texture: As selected by Architect and Owner from manufacturer's full range.
- C. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.

3.6 INSTALLATION OF JOINT SEALANTS

- A. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements in Division 07 Section "Joint Sealants" and in ASTM C1481.
 - 1. Apply joint sealants after base coat has cured but before applying finish coat.
 - 2. Clean surfaces to receive sealants to comply with indicated requirements and EIFS manufacturer's written instructions.
 - 3. Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.
 - 4. Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
 - 5. Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.
 - 6. Recess sealant sufficiently from surface of EIFS so an additional sealant application, including cylindrical sealant backing, can be installed without protruding beyond EIFS surface.
- B. Leave finished sealant work in a neat, clean condition with no evidence of spillovers onto adjacent surfaces.

3.7 PROTECTION

- A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive system coatings.
- B. Provide final protection and maintain conditions in a manner acceptable to Installer and system manufacturer that ensures system is without damage or deterioration at time of Project Acceptance.

END OF SECTION 07 24 13

SECTION 07 27 26 –WEATHER-RESISTIVE AIR BARRIERS

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 fluid applied, UV and mold resistant water-based elastomeric weather resistive barrier (WRB) membrane.

1.3 DEFINITIONS

- A. ABAA: Air Barrier Association of America.
- B. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PRECONSTRUCTION TESTING

- A. Mockup Testing: Air barrier assemblies shall comply with performance requirements indicated, as evidenced by reports based on mockup testing by a qualified testing agency.
 - 1. Owner will engage a qualified testing agency.
 - 2. Quantitative Air Leakage Testing: Testing of the mockup for air leakage will be conducted not to exceed the test pressure differential, positive and negative, indicated in "Performance Requirements" Article for air barrier assembly air leakage when tested according to ASTM E2357.
 - 3. Notify Architect seven days in advance of the dates and times when mockup testing will take place.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum of 20 years' experience in the production of air barrier materials, with minimum of 5 years in the production of fluid-applied membrane air barriers.
- B. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance and that is an ABAA-licensed contractor, employs certified and registered installers, and complies with ABAA's Quality Assurance Program.
- C. Mockups: Before beginning installation of air barrier, build mockups of exterior wall assembly 150 sq. ft. (14 sq. m), incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation,

crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.

1. Coordinate construction of mockup to permit inspection by Owner's testing agency of air barrier before external insulation and cladding is installed.
2. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
3. If Architect and Owner determine that mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Preinstallation Conference: Conduct conference at Project site.

1. Include installers of other construction connecting to air barrier, including roofing, waterproofing, architectural precast concrete, masonry, sealants, windows, glazed curtain walls, and door frames.
2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.6 WARRANTY

A. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace waterproofing system that does not comply with requirements or that fail in materials, fabrication, or installation within specified warranty period. Warranty does not include normal weathering.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

2.2 WEATHER-RESISTIVE AIR BARRIER (WRB)

- A. Fluid-Applied, Vapor Permeable Membrane Air Barrier: Two-component, self-curing synthetic-rubber-based membrane, free of solvents, isocyanates and bitumen, suitable for spray application to wet film and dry film thickness of 60 mils (1.5 mm).
- B. Basis-of-Design Product: Dryvit Systems.; Backstop NT System

1. Joint Treatment, Rough Opening Protection, and Detail Components: Dryvit AquaFlash System w/ AquaFlash flashing compound, Aquaflash tape, Dryvit Joint Tape
- C. Self-Adhered Flashing: located at the horizontal planes of vertical transitions lapped over the air barrier. The accepted air barrier manufacture shall provide a letter stating the self-adhered flashing is compatible with their air barrier.
- D. Termination Sealant: ultra-low modulus designed for minimum 100% elongation and minimum 50% compression.
 1. Compatible with air barrier, roofing and waterproofing membranes and substrate,
 2. Remains flexible with aging,
 3. Seals construction joints up to 1 inch wide

PART 3 - EXECUTION (NOT USED)

END OF SECTION 07 27 26

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SECTION 07 42 10.21 - CONTINUOUS INSULATION (CI) WITH COMPOSITE FRAMING
SUPPORT (CFS) SYSTEM

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 SECTION INCLUDES

- A. Continuous insulation (CI) composite framing support (CFS) system integrated with exterior wall cladding.

1.3 RELATED REQUIREMENTS

- A. Section 05 40 00 – Cold-Formed Metal Framing: Metal stud substrate support framing.
- B. Section 07 21 00 – Building Insulation: Insulation installed with CFS system.
- C. Section 07 92 00 – Joint Sealants: Perimeter sealant.
- D. Section 09 29 00 – Gypsum Board: Exterior sheathing

1.4 SYSTEM DESCRIPTION

- A. At Exterior Vertical Metal Panel System: From framing to outer exposed surface:
 - 1. Exterior gypsum sheathing.
 - 2. Continuous fluid applied weather-resistive air barrier system, See 07 27 26
 - 3. 3” horizontal CFS system with integrated 3” thick mineral wool insulation.
 - 4. Vertical Metal panel system.
- B. At Exterior Composite Metal Panel ACM System: From framing to outer exposed surface:
 - 1. Exterior gypsum sheathing.
 - 2. Continuous fluid applied weather-resistive air barrier system, See 07 27 26
 - 3. 1” CFS system with 1” thick integrated mineral wool insulation.
 - 4. 4mm composite metal panel ACM system w/ 2” infill mineral wool insulation
- C. At Exterior Phenolic Wood Rainscreen: From framing to outer exposed surface:
 - 1. Exterior gypsum sheathing.
 - 2. Continuous fluid applied weather-resistive air barrier system, See 07 27 26
 - 3. 3” horizontal CFS system with integrated 3” mineral wool board insulation.
 - 4. Vertical Battens.
 - 5. Phenolic panels with concealed fastener clips.
- D. At Exterior Phenolic Colored Rainscreen: From framing to outer exposed surface:
 - 1. Exterior gypsum sheathing.
 - 2. Continuous fluid applied weather-resistive air barrier system, See 07 27 26
 - 3. 3” horizontal CFS system with integrated 3” mineral wool board insulation.

4. Vertical Battens.
5. Phenolic panels with concealed fastener clips.

1.5 WARRANTY

- A. CI and CFS System Warranty: Provide written warranty by manufacturer and installer agreeing to correct defects in manufacturing
 1. Warranty Period: 5 years from date of Project Acceptance.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural: Measure the performance of the factory formed joints using a minimum of 30 psf (ASTM E72)
- B. System Thermal Design: Ensure installed CI and CFS system, sub-framing, clips and cladding attachment does not have thermal bridging of fasteners or framing that creates a continuous metal path from exterior surface of insulation to interior face of insulation.
 1. System thermal design shall meet or exceed thermal design requirements in compliance with ASHRAE 90.1 and 2019 CBC energy codes.
 2. Thermal Resistance:
 - a. Wall assembly R Value: As indicated in the documents.
 3. Thermal Performance Test: Provide thermal resistance (R-value) indicated, in compliance with ASTM C1363, corrected to 15 mph outside and still air inside, with installed condition including fastening and joints.
 - a. Provide efficiency of no less than 93 to 98 percent, with a maximum temperature differential of 18 degrees F from interior wall surface to interior wall cavity and node locations with a 70 degrees F exterior to interior wall temperature delta.
 - b. Provide test unit with at least one insulation panel horizontal and vertical joint length and height of test chamber area.
 - c. Provide finite element analysis of three dimensional simulation of described wall assembly sealed by professional engineer in compliance with performance requirements and exceeding it by at least 3 percent.
- C. Temperature: Comply with structural loading requirements within temperature range of minus 55 degrees F to 180 degrees F.
- D. Fire-Test-Response Characteristics: Provide composite framing support system with fire-test results indicated as determined by test standard indicated and applied by UL or other testing and inspection agency acceptable to authorities having jurisdiction.
 1. Surface Burning Characteristics: In compliance with ASTM E84, for foam insulation, fiber reinforced polymer (FRP) and interior surfaces as follows:
 - a. Flame Spread Index (FSI): 25 or less.
 - b. Smoke Developed Index (SDI): 450 or less.
 2. Intermediate Scale Multistory Fire Test: Comply with NFPA 285 and/or IBC acceptance criteria for wall height above grade and fire separation distances, when

wall type and other noted conditions require such testing or compliance with requirements as indicated.

2.2 MANUFACTURER

- A. Basis-of-Design Product: Advanced Architectural Products (A2P): SMARTci 2-in-1 System

2.3 DESCRIPTION

- A. CFS system components anchored to exterior sheathing over metal stud framing.
 - 1. Refer to Section 05 40 00 for metal stud framing.
- B. Install CI panels and CFS system components horizontally on substrate system in compliance with specified requirements.

2.4 COMPOSITE FRAMING SUPPORT (CFS) SYSTEM

- A. CFS System: Provide CFS system consisting of polyester and vinyl ester bioresin matrix (FRP) with recycled materials, fire retardant additives and integral continuous metal inserts the length of profile. Reinforce CFS system with glass strand rovings used internally for longitudinal (lengthwise) strength and continuous strand glass mats or stitched reinforcements used internally for transverse (crosswise) strength.
 - 1. Depth of composite framing support: As indicated on Drawings.
 - 2. On Center Spacing: As indicated on Drawings.
 - 3. Provide continuous non-corrosive steel insert for engagement of fasteners, 16 gage, minimum thickness, with G90 galvanized coating designation in compliance with ASTM A653/A653M.
 - a. Fully engage steel insert with adjacent CFS at ends.
 - b. Anchor sub-girts and other wall cladding support accessories to steel insert set into and part of CFS.
 - 4. Provide integral 3-point compression seal in CFS sections to ensure insulation panel will not dislodge.
 - 5. Provide integral anti-siphon grooves on exterior and interior flanges of CFS.
 - 6. Provide force distribution zones integrally designed into profile of CFS.
 - 7. Provide spline seals for adjacent insulation units into profile of CFS.
 - 8. Fire-Test-Response Characteristics: Provide composite framing support system with fire-test results indicated as determined by test standard indicated and applied by UL or other testing and inspection agency acceptable to authorities having jurisdiction.
 - a. Surface Burning Characteristics: In compliance with ASTM E84, for foam insulation, fiber reinforced polymer (FRP) and interior surfaces as follows:
 - b. Flame Spread Index (FSI): 25 or less.
 - c. Smoke Developed Index (SDI): 450 or less.
 - 9. Flammability: Comply with ASTM E84.
 - 10. Self-Extinguishing: Comply with ASTM D635.
 - 11. Profile Visual Requirements: Comply with ASTM D4385.
 - 12. Tensile Stress: Provide engineered lengthwise and crosswise tensile stress in compliance with performance loading criteria and specified safety factors, in accordance with ASTM D638.

13. Compressive Stress: Provide engineered lengthwise and crosswise compressive stress in compliance with performance loading criteria and specified safety factors, in accordance with ASTM D695.
14. Flexural Stress: Provide engineered lengthwise and crosswise flexural stress in compliance with performance loading criteria and specified safety factors, in accordance with ASTM D790.
15. Modulus of Elasticity: Engineered to meet performance loading criteria and specified safety factors.
16. Barcol Hardness: 45, in accordance with ASTM D2583.
17. Water Absorption: Less than 0.46 percent by weight, within 24 hours, tested in accordance with ASTM D570.
18. Density: Within range of 0.062 to 0.070 lbs/cubic inch, in accordance with ASTM D792.
19. Lengthwise Coefficient of Thermal Expansion: 7.0×10^{-6} inch/inch/degrees F, in accordance with ASTM D696.
20. Notched Izod Impact, Lengthwise: 24 ft lbs/inch, in accordance with ASTM D256 within temperature range indicated.
21. Notched Izod Impact, Crosswise: 4 ft lbs/inch, in accordance with ASTM D256 within temperature range indicated.

2.5 INSULATION

- A. Insulation Panel Edges: Provide factory formed edges on insulation panels that interlock with CFS system components.
- B. Polyisocyanurate Panel Insulation: Rigid closed cell foam, complying with ASTM C1289; Type I with impermeable aluminum foil facing on both sides; Class 1 with non-reinforced foam core at walls; Type II, Class 1, cellulose felt or glass fiber mat both faces; Grade 3, 25 psi compressive strength at roof.
 1. Flame Spread Index (FSI): 25 or less, tested in accordance with ASTM E84.
 2. Smoke Developed Index (SDI): 450 or less, tested in accordance with ASTM E84.
 3. Thermal Resistance: ASTM C518 at 75 degrees F, as indicated on Drawings.
 4. Comply with fire-resistance requirements, as indicated on drawings, and as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 5. Board Edges: Square.
 6. Compressive Strength: Grade 1, 16 psi at walls; Grade 3, 25 psi at roof; tested in compliance with ASTM D1621.
 7. Dimensional Stability: Less than 2 percent linear change after 7 days; ASTM D2126.
 8. Moisture Vapor Permeance: Less than 0.05 perm; ASTM E96/E96M.
 9. Water Absorption: Less than 0.05 percent by volume; tested to ASTM C209.
 10. Service Temperature: Range of minus 100 degrees F to 250 degrees F.

2.6 ASSEMBLY

- A. Assemble CI with CFS system using manufacturer's standard procedures and processes identical to tested units and as necessary to comply with performance requirements indicated.
 1. Comply with CFS system and dimensional and structural requirements as indicated on drawings.

2. Erect CFS system in sequence in accordance with manufacturer's standard installation procedures.
3. CFS and CI panels shall create an air/water/vapor barrier system compliant with requirements for project.
4. Provide spray foam sealant on backside of cantilevered fasteners that completely puncture the insulation layer.

2.7 ACCESSORIES

- A. Provide accessories necessary for complete CFS system including metal closure trim, transition angle, strapping, tie-in brackets, and similar items.
- B. Fasteners: Corrosion-resistant, self-tapping and self-drilling screws, bolts, nuts, and other fasteners as recommended by CFS system manufacturer for project application.
 1. Cladding to CFS System: Use standard self-tapping metal screws.
 2. CFS System to Metal Stud Wall Framing: Use standard self-tapping metal screws.
 3. CFS System to Concrete/CMU: Use standard masonry or concrete screw anchors in predrilled hole.
 4. CFS System to Wood Framing: Use standard wood screw anchors.
 5. DO NOT USE powder, air, or gas actuated fasteners or actuated fastener tools. DO NOT USE impact wrenches when fastening to or from the CFS.
- C. Tape: Pressure sensitive adhesive coated polypropylene woven fabric. Must be mold, water, tear and UV resistant. Must be applicable in a wide temperature range (-20 degrees F).
- D. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, square long edges, Type X fire-resistant.
- E. Air Barrier (WRB): Refer to Section 07 27 26 for requirements.
- F. Sealants: Provide sealants as recommended by CFS manufacturer for openings within CFS system and perimeter conditions.
 1. Refer to Section 07 92 00 for sealant information.

PART 3 - EXECUTION

- A. Prepare sub-framing, base angles, sills, furring, and other CFS system members and provide anchorage in accordance with ASTM C754 for substrate type and wall cladding type in accordance with manufacturer's installation instructions.

END OF SECTION 07 42 10.21

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SECTION 07 42 13 – METAL WALL PANELS

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 SECTION INCLUDES

- A. Concealed fastener vertical metal wall panels installed using back ventilated rainscreen design principle

1.3 RELATED SECTIONS

- A. Section 07 27 26 – Weather-Resistive Air Barriers
- B. Section 07 60 00 - Flashing and Sheet Metal: Flashings and other sheet metal work not part of metal wall panel assemblies.
- C. Section 07 92 00 - Joint Sealants: Field-applied sealants not otherwise specified in this Section.
- D. Section 09 22 16 – Non-Structural Metal Framing: Secondary support framing supporting composite wall panels

1.4 WARRANTY

- A. Material Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the warranty include structural performance and finish performance.
 - 1. Warranty Period: Two (2) years from date of Substantial Completion.
- B. Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish, including flaking or peeling from approved primed metal substrate, chalk in excess of 8 when tested in accordance with ASTM D4214, Method A, and /or color fading in excess of 5 ΔE Hunter units on panels when tested in accordance with ASTM D2244.
 - 1. Warranty Period: Twenty (20) years from date Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

PART 2 - PRODUCTS

2.1 MANUFACTURER:

- 1. Basis-of-Design: Kingspan W-12 Concealed Fastener Wall Panel System, color: "Zinc Gray"

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal wall panel systems designed to resist the following. Testing shall be done based on ASTM E330:
 - 1. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - a. Uniform pressure: see structural documents
 - 2. Deflection Limits: Metal wall panel assemblies shall withstand horizontal deflection no greater than L/240 of the span.
- B. Water Penetration under Static Pressure: Provide metal wall panel systems designed to resist penetration of water under static pressure. Testing shall be based on ASTM E331. Wall panels when tested shall have no water leakage at 6 pounds per square foot.
- C. Air Infiltration: Provide metal wall panel assemblies designed to resist air infiltration. Testing shall be done based on ASTM E283. Wall panels when tested shall have a maximum air leakage of 0.01 cfm per square feet of fixed wall area at a minimum static air-pressure differential of 1.57 foot pounds per square foot.

2.3 WALL PANEL MATERIALS

- A. Stainless Steel Sheet:
 - 1. ASTM A240 or ASTM A666, Type 304, dead soft, fully annealed
 - 2. Gauge: 22

2.4 CONCEALED FASTENER WALL PANELS

- A. Wall Panel Description:
 - 1. Panel Width: 12 inches
 - 2. Profile: W-12
 - 3. Panel Height: 1-1/2"
 - 4. Panel Joint: Tongue and Groove Interlock Joint
 - 5. Texture: Smooth
 - 6. Color: Zinc Gray

2.5 INSULATION

- A. Refer to Section 07 21 00 – Building Insulation
- B. Glass-Fiber Board Insulation: ASTM C612, Type IA, unfaced semi rigid insulation. Nominal density of 3 pounds per cubic foot. Size as required for liner panels.

2.6 ACCESSORIES

- A. Wall panel accessories: Provide accessories as required for a complete installation. Accessories shall be as indicated on approved shop drawings and per manufacturer's approved standard details.
 - 1. Metal Profile Closure Strips: Shall be fabricated from same gauge, material and finish as metal panel.
 - 2. Swedged ends: Factory crimped end laps.

- B. Trim:
 - 1. Fabricate trim from same material and material thickness as wall panels. Finish to match metal wall panels.
 - 2. Locations include, but are not limited to the following: Drips, sills, jambs, corners, framed openings, parapet caps, reveals and fillers.
 - 3. Trim shall be provided under Section 07 62 00 - Sheet Metal Flashing and Trim”, finish to match panel.

- C. Metal Framing:
 - 1. General: ASTM C645, cold-formed metallic-coated steel sheet
 - 2. Hat-Shaped, Rigid Furring Channels:
 - a. Nominal Thickness: 0.040 inch
 - b. Depth: as indicated on drawings
 - 3. Cold-Rolled Furring Channels: Minimum 1/2-inch wide flange.
 - a. Nominal Thickness: 0.064 inch
 - b. Depth: As indicated on Drawings
 - c. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with 0.040-inch nominal thickness.
 - d. Tie Wire: ASTM A641, Class 1 zinc coating, soft temper, 0.062-inch diameter wire, or double strand of 0.048-inch diameter wire.

- D. Panel Sealant:
 - 1. Joint Sealant: ASTM C920 as recommended in writing by metal wall panel manufacturer.
 - 2. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

END OF SECTION 07 42 13

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SECTION 07 42 43 – COMPOSITE WALL PANELS

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 SECTION INCLUDES

- A. Composite wall panel, dry joint, pressure-equalized rainscreen system at:
 - 1. Composite Wall Panel System, Roof fascia
 - 2. Composite Wall Panel System, ACM between vertical metal panel and curtainwall.
- B. Accessories including subgirts, aluminum panel splines, aluminum panel bases, head flashings, clips, shims, fasteners and aluminum trim prefinished to match aluminum wall panels
- C. Parapet coping, column covers, sills, border, and filler items indicated as integral components of the panel system or as designed.

1.3 RELATED SECTIONS

- A. Section 07 27 26 – Weather-Resistive Air Barriers
- B. Section 09 54 23- Linear Plank Metal Ceiling System
- C. Section 07 60 00 - Flashing and Sheet Metal: Flashings and other sheet metal work not part of metal wall panel assemblies.
- D. Section 07 92 00 - Joint Sealants: Field-applied sealants not otherwise specified in this Section.
- E. Section 09 22 16 – Non-Structural Metal Framing: Secondary support framing supporting composite wall panels

1.4 MOCKUPS

- A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution and set quality standards for fabrication and installation.
 - 1. Build full thickness, including face and backup as indicated on Drawings.
 - 2. Prepare mockup for review during preinstallation meeting.
 - 3. Coordinate composite wall panel mockup with adjoining materials as specified in Section 01 4339.
 - 4. Obtain Architect and Owner's Representative's approval before initiating full building construction.
 - 5. Obtain Architect and Owner's Representative's approval before initiating full building construction.

6. Prepare mock-up with the same products, tools, equipment and techniques required for the actual applications and employing same workers who will install the system. The finish used shall be from the same batch that is being used on the project.
 7. Protect approved mockups from the elements with weather-resistant membrane and retain mockup as a basis for approval of completed installation. Properly dispose of mockup at completion and acceptance of Project.
 8. If Architect or Owner's Representative determines mockups do not comply with requirements, reconstruct mockups until mockups are approved.
- B. Approval of mockups is for relationship of adjacent materials and aesthetic qualities of fabrication and installation.
1. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect and Owner's Representative in writing.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal composite material panel systems that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal composite material panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 COMPOSITE PANELS

- A. Basis-of-Design: North Clad, The ACM Composite Panel Series
1. Panel Skin Material:
 - a. Roof Fascia: the Classic Collection Alucobond Color Chart, PVDF 2 "Bone White"
 - b. ACM between vertical metal panel and curtainwall: PVDF custom color to match curtainwall mullion, "Night Hawk Gray"
 2. Panel Material Thickness: 4mm (0.157-inch).

- B. Product Performance:
1. Bond Integrity: When tested for bond integrity, in accordance with ASTM D1781 (simulating resistance to panel delamination), there shall be no adhesive failure of the bond a) between the core and the skin nor b) cohesive failure of the core itself below the following values:
 - a. Bond Strength: 214 psi (Vertical Pull).
 - b. Peel Strength: 115 N mm/mm (22.5 in lb/in) as manufactured 115 N mm/mm (22.5 in lb/in) after 8 hours in water at 200°F 115 N mm/mm (22.5 in lb/in) after 21 days soaking in water at 70°F.
 - c. Peel Strength:
 - 1) 115 N mm/mm (22.5 in lb/in) as manufactured.
 - 2) 115 N mm/mm (22.5 in lb/in) after 21 days soaking in water at 70°F.
- C. Fire Performance:
1. ASTM E84: Flame Spread Index must be less than 25, Smoke Developed Index must be less than 450.
 2. ASTM D1929: A self ignition temperature of 650 deg. F or greater.
 3. ASTM D635: Requires a CC1 classification.

2.2 PANEL FABRICATION

- A. Composition: Two sheets of aluminum sandwiching a solid core of extruded thermoplastic material formed in a continuous process with no glues or adhesives between dissimilar materials. The core material shall be free of voids and/or air spaces and not contain foamed insulation material. Products laminated sheet by sheet in a batch process using glues or adhesives between materials shall not be acceptable.
- B. Aluminum Face Sheets: Coil-coated sheet, ASTM B209, alloy as specified, with temper as required to suit forming operations and structural performance required.
1. Thickness: 0.50mm (0.0197-inch) nominal.
 2. Alloy: AA5000 Series Anodized material.
 3. Finish: Coil coated.
 4. Surface: Smooth, flat finish.
- C. Panel Weight:
1. 4mm (0.157"): 1.12 lbs/sq ft.
- D. Tolerances:
1. Panel Bow: Maximum 0.8% of any 72-inches (1828 mm) panel dimension.
 2. Panel Dimensions: Perform fabrication under controlled shop conditions to the greatest extent possible. Field fabrication may be allowed when approved by Architect and Owner, but shall be kept to an absolute minimum.
 3. Keep panel lines, breaks, and angles sharp and true, and surfaces free from warp and buckle.
 4. Maximum Deviation from Panel Flatness: 1/8-inch in 5'-0" on panel in any direction for assembled units. (Non-accumulative - No Oil Canning).

2.3 SYSTEM CHARACTERISTICS

- A. Plans, elevations, details, characteristics, and other requirements indicated are based upon standards by one manufacturer. It is intended that other manufacturers, receiving prior

approval, may be acceptable, provided their details and characteristics comply with size and profile requirements, and material/performance standards.

- B. System must not generally have any visible fasteners, telegraphing or fastening on the panel faces or any other compromise of a neat and flat appearance.
- C. System shall comply with the applicable provisions of the "Metal Curtain Wall, Window, Storefront, and Entrance Guide Specifications Manual" by AAMA and ANSI/AAMA 302.9 requirements for aluminum windows.
- D. Fabricate panel system to dimension, size, and profile indicated on the drawings based on a design temperature of 70°F.
- E. Fabricate panel system so that no restraints can be placed on the panel, which might result in compressive skin stresses. The installation detailing shall be such that the panels remain flat regardless of temperature change and at all times remain air and water tight.
- F. The finish side of the panel shall have a removable plastic film applied prior to fabrication, which shall remain on the panel during fabrication, shipping, and erection to protect the surface from damage.
- G. System Type:
 - 1. Rout and Return Dry: System must provide a perimeter aluminum extrusion with integral weatherstripping as detailed on drawings. No field sealant required in joints unless specifically noted on Drawings.
- H. System Performance: Composite panels shall be capable of withstanding building movements and weather exposures based on the following test standards required by the Architect and/or the local building code.
 - 1. Wind Load: If system tests are not available, mock-ups shall be constructed and tests performed under the direction of an independent third party laboratory, which show compliance to the following minimum standards:
 - a. Panels shall be designed to withstand the Design Wind Load based upon the local building code, but in no case less than 20 pounds per square foot (psf) and 30 psf on parapet and corner panels. Wind load testing shall be conducted in accordance with ASTM E330/E330M to obtain the following results.
 - b. Normal to the plane of the wall between supports, deflection of the secured perimeter-framing members shall not exceed $L/175$ or $3/4"$, whichever is less.
 - c. Normal to the plane of the wall, the maximum panel deflection shall not exceed $L/60$ of the full span.
 - d. Maximum anchor deflection shall not exceed $1/16"$.
 - e. At 1-1/2 times design pressure, permanent deflections of framing members shall not exceed $L/100$ of span length and components shall not experience failure or gross permanent distortion. At connection points of framing members to anchors, permanent set shall not exceed $1/16"$.
 - 2. Uniform Load Deflection:
 - a. At +25.0 pounds per square foot design load: No damage.
 - b. At -25.0 pounds per square foot design load: No damage.
 - c. Repeat Static Pressure Air Infiltration:
 - 1) At 6.24 pounds per square foot: Less than 0.01 cubic feet per minute per square foot.

- 2) At 15.00 pounds per square foot: No uncontrolled leakage
 - 3) Dynamic Pressure Water Resistance (at 15 pounds per square foot): No uncontrolled leakage
 3. Air/Water System Test: If system tests are not available, mock-ups shall be constructed and tests performed under the direction of an independent third party laboratory, which show compliance to the following minimum standards:
 - a. Air Infiltration - When tested in accordance with ASTM E283, air infiltration at 1.57 psf must not exceed 0.06 cfm/ft² of wall area.
 - 1) Static Pressure Air Infiltration (at 6.24 pounds per square foot): Less than 0.01 cubic feet per minute per square foot.
 - b. Water Infiltration - Water infiltration is defined as uncontrolled water leakage through the exterior face of the assembly. Systems not using a construction sealant at the panel joints (i.e. Rout and Return Dry and Rear Ventilated Systems) shall be designed to drain any water leakage occurring at the joints. No water infiltration shall occur in any system under a differential static pressure of 6.24 psf after 15 minutes of exposure in accordance with ASTM E331.
 - 1) Water Penetration in accordance with ASTM E 331 (at 6.24 pounds per square foot): Approximately 0.3 square feet.
 - 2) Water Penetration in accordance with AAMA 501.1 (at 6.24 pounds per square foot): Approximately 0.8 square feet. Visible fasteners, telegraphing or fastening on the panel faces or any other compromise of a neat and flat appearance of the system is not allowed.
 - 3) Static Pressure Air Infiltration (at 6.24 pounds per square foot): Less than 0.01 cubic feet per minute per square foot.
 4. Pressure Equalized Rainscreen:
 - a. Interstory Horizontal Displacement (drift):
 - 1) At 3/4-inch left/right: No visible damage.
 - b. Interstory Horizontal Displacement (maximum):
 - 1) At 3.0 inches left/right: No visible damage.
 - c. Repeat Static Pressure Air Infiltration:
 - 1) At 6.24 pounds per square foot: Less than 0.01 cubic feet per minute per square foot.
 - 2) At 15.00 pounds per square foot: No uncontrolled leakage.
 - d. Uniform Structural Overloads:
 - 1) At +37.5 pounds per square foot (Overloads): No damage.
 - 2) At -37.5 pounds per square foot (Overloads): No visible damage.
 - I. System shall comply with the applicable provisions of the "Metal Curtain Wall, Window, Storefront, and Entrance Guide Specifications Manual" by AAMA and ANSI/AAMA 302.9 requirements for aluminum windows.
 - J. Fabricate panel system to dimension, size, and profile indicated on the Drawings based on a design temperature of 70°F.
 - K. Fabricate panel system so that no restraints can be placed on the panel that might result in compressive skin stresses. Detail panels to remain flat regardless of temperature change and at all times remain air and water tight after installation.

- L. Apply a removable plastic film to the finish side of the panel prior to fabrication which shall remain on the panel during fabrication, shipping, and erection to protect the surface from damage.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Coil coated Kynar 500 based polyvinylidene fluoride (PVDF) resin in conformance with the following general requirements of AAMA 2605.
 - 1. Color: Where adjacent to window mullion, match curtain wall system. See Section 08 44 13. Where adjacent to standing seam roof, match roof trim.
 - a. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Coating Thickness:
 - a. Colors: 1.0 mil (± 0.2 mil).
 - b. Clear: 0.50 mil (± 0.05 mil).
 - 3. Hardness: ASTM D3363; HB minimum using Eagle Turquoise Pencil.
 - 4. Impact:
 - a. Test Method: ASTM D2794; Gardner Variable Impact Tester with 5/8" mandrel.
 - b. Coating shall withstand reverse impact of 1.5"/pounds per mil substrate thickness.
 - c. Coating shall adhere tightly to metal when subjected to #600 Scotch Tape pick-off test. Slight minute cracking permissible. No removal of film to substrate.
 - 5. Adhesion:
 - a. Test Method: ASTM D3359.
 - b. Coating shall not pick off when subjected to an 11" x 11" x 1/16" grid and taped with #600 Scotch Tape.
 - 6. Humidity Resistance:
 - a. Test Method: ASTM D2247.
 - b. No formation of blisters when subjected to condensing water fog at 100% relative humidity and 100°F for 3000 hours.
 - 7. Salt Spray Resistance:
 - a. Test Method: ASTM B117; Expose coating system to 4000 hours, using 5% NaCl solution.
 - b. Corrosion creepage from scribe line: 1/16" max. (1.6mm).
 - c. Minimum blister rating of 8 within the test specimen field.

8. Weather Exposure:
 - a. Outdoor:
 - 1) Five year exposure at 45° angle facing south Florida exposure.
 - 2) Maximum color change of 5 Delta E units as calculated in accordance with ASTM D2244.
 - 3) Maximum chalk rating of 8 in accordance with ASTM D4214.
 - 4) No checking, crazing, adhesion loss.
 9. Chemical Resistance: No loss of film adhesion or visual change when viewed by the unaided eye:
 - a. ASTM D1308 utilizing 10% Muriatic Acid for an exposure time of 15 minutes.
 - b. ASTM D1308 utilizing 20% Sulfuric Acid for an exposure time of 18 hours.
 - c. AAMA 2605 utilizing 70% reagent grade Nitric Acid vapor for an exposure time of 30 minutes. Maximum color change of 5 Delta E units as calculated in accordance with ASTM D2244.
- E. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.5 ACCESSORIES

- A. Extrusions, Formed Members, Sheet, and Plate: ASTM B209, and the recommendations of the manufacturer.
- B. Panel stiffeners, if required, shall be structurally fastened or restrained at the ends and shall be secured to the rear face of the composite panel with silicone of sufficient size and strength to maintain panel flatness. Stiffener material and/or finish shall be compatible with the silicone.
- C. Sealants and gaskets within the panel system shall be as per manufacturer's standards to meet performance requirements.
- D. Fabricate flashing materials from 0.030" minimum thickness aluminum sheet painted to match the adjacent curtain wall / panel system where exposed. Provide a lap strap under the flashing at abutted conditions and seal lapped surfaces with a full bed of non-hardening sealant.
- E. Fasteners (concealed/exposed/non-corrosive): Fasteners as recommended by panel manufacturer. Do not expose fasteners except where unavoidable and then match finish of adjoining metal.

PART 3 - EXECUTION

- A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorage according to ASTM C754 and metal-faced composite wall panel manufacturer's written instructions.
- B. Water Penetration: Test areas of installed system for compliance with system performance requirements according to ASTM E331 at minimum differential pressure of 20 percent of

inward-acting, wind-load design pressure as defined by SEI/ASCE 7, but not less than 6.24 lbf/sq. ft. (300 Pa).

- C. Water-Spray Test: After completing the installation of 75-foot- (23-m-) by-2-story minimum area of metal-faced composite wall panel assembly, test assembly for water penetration according to AAMA 501.1 in a 2-bay area directed by Architect and Owner.

END OF SECTION 07 42 43

SECTION 07 4253 – PHENOLIC RAINSCREEN PANELS

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 SECTION INCLUDES

- A. Exterior ventilated phenolic rainscreen system.

1.3 RELATED SECTIONS

- A. Section 07 2100 – Building Insulation: Insulation installed behind rainscreen.
- B. Section 07 27 26 – Weather-Resistive Air Barriers: Underlayment waterproofing installed with rainscreen system.

1.4 COORDINATION

- A. Coordinate phenolic wall panel assemblies with rain drainage work, flashing, trim, and construction of studs, soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.5 ACTION SUBMITTALS

- A. Delegated-Design Submittal: For phenolic rainscreen system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of phenolic rainscreen system.
 - 2. Include design calculations.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer and Installer.
 - 1. If rainscreen manufacturer does not install rainscreen, provide certification from manufacturer indicating Installer is acceptable.
- B. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

- D. Research/Evaluation Reports: For each type of wall panel required.
- E. Submit documents showing product compliance with the local building code prior to the bid. Alternate materials must be approved by the Architect prior to the bid date.

1.7 QUALITY ASSURANCE

- A. Source Limitations for Wall Panel: Obtain each type, color, and pattern of wall panel, including related accessories, through one source from a single manufacturer.
- B. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact joint sealants to joint-sealant manufacturers for testing indicated in subparagraphs below:
 - 1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Submit no fewer than nine pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule enough time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
- C. Installer Qualifications: Fabricator of phenolic wall panels.
 - 1. Installer's responsibilities include fabricating and installing phenolic wall panel assemblies and providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of data for phenolic wall panels, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
 - 3. Design shall include, but not be limited to attachment to sub-construction, panel-to-panel joinery, panel-to-dissimilar-material joinery, and joint seals associated with the phenolic wall panel system.
- D. Mockup: Build mockup to verify selections made under sample submittals and to demonstrate aesthetic effects.
 - 1. Build mockup of typical wall area as shown on approved Shop Drawings.
 - 2. Locate mockup where directed by Architect and Owner's representative.
 - 3. Do not proceed with construction of mockup until all submittals for the mockup have been approved by the Architect and Owner's representative.
 - 4. Construct mockup using identical detailing, erection and finishing procedures as proposed for the Work.
 - 5. Approved mockup establishes minimum standard of quality, fabrication, and installation for the Work.
 - 6. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect and Owner's representative in writing.
 - 7. Approved mockups may become part of the completed Work if undisturbed at time of Final Completion.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of phenolic wall panel assemblies that fail in materials, fabrication, or installation within specified warranty period. Failures include, but are not limited to, the following:
1. Cracking.
 2. Deforming.
 3. Delamination between the veneer and core, or otherwise deteriorating beyond normal weathering.
 4. Warranty Period: Ten years from date of Final Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Performance Requirements: Design system to withstand design loads as required by CBC but not less than the following minimum loads:
1. Wind Pressure: 25 psf minimum, positive and negative.
 2. Seismic Loads: As required by 2016 CBC.
 3. Maximum Story Drift: 1/4-inch.
 4. Maximum Allowable Deflection: 1/300 between supports applies to all components of the façade construction.
- B. Design panel system to provide movement of components without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to seasonal temperature ranges.
1. Design system to accommodate tolerances of structure.
- C. Design the installation in such a way that any restraint between the phenolic wall panel systems and sub-framing is avoided. Do not tie framing together.
- D. Design panel system to provide a ventilated air space between panels and underlayment based on a rain screen or rear ventilated façade design principle with openings at the base and top of the panel areas.
- E. Ventilated rainscreen system shall provide complete secondary drainage system, draining at base of wall. Supporting substrate for exterior wall panels shall comply with all current codes and regulations.
- F. Recycled Content: Provide phenolic panel products made with average recycled content postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- G. Composite Wood and Agrifiber: Use only composite wood and agrifiber products free of added urea formaldehyde resin binders.
- H. Phenolic Panel Materials: Provide only phenolic panel products that are GREENGUARD Certified.

2.2 PHENOLIC SCREEN MATERIAL

A. Basis-of-Design Product

1. Basis-of-Design Type 1 “Horizontal Wood-Look”: Trespa International, Trespa Pura, staggered joint layout; concealed fastener system, Color: “Romantic Walnut”
2. Basis-of-Design Type 2 “Colored Wall Panel”: Trespa International, Trespa Meteon, concealed fastener system, Colors from Trespa Unicolour Series: “Pacific,” “Rusty Red,” “Verdigris,” “Turf Green”, finish: Satin

2.3 WALL PANELS

A. Solid Phenolic Wall Panels:

1. Material: Solid flush panel siding manufactured using a combination of high pressure and temperature to create a flat panel created from thermosetting resins, homogenously reinforced with wood-based fibers and an integrated decorative surface or printed décor.
 - a. Colors: See above
 - b. Factory applied anti-graffiti coating
2. Panel Core: ASTM E84; fire retardant (FR) black core.
3. Panel Thickness: As indicated on the Drawings.
4. Physical Properties:
 - a. Modulus of Elasticity: 1,300,000 psi (9000 N/mm²) minimum, ISO 178.
 - b. Tensile Strength: 10,100 psi (70 N/mm²) minimum, ISO 527-2.
 - c. Flexural Strength: 14,500psi (120 N/mm²) minimum, ISO 178.
 - d. Thermal Conductivity: 2.1 BTU/inch/ft².hr.°F, EN 12524.
 - e. Structural Performance (ASTM E330/E330M):
 - 1) Panels shall be designed to withstand the Design Wind Load based upon the local building code, but in no case less than 15 pounds per square foot (psf). Wind load testing shall be done in accordance with this standard to obtain the following results:
 - 2) Normal to the plane of the wall, the maximum panel deflection shall not exceed L/175
 - 3) Normal to the plane of the wall between supports, deflection of the aluminum sub-framing members shall not exceed L/175 or 3/4 inch, whichever is less
 - a) At 1-1/2 times design pressure, permanent deflection of framing members shall not exceed L/100 of span length and components shall not experience failure or gross permanent distortion.
 - b) If system tests are not available, mock ups shall be constructed and tests performed under the direction of an independent third party laboratory which show compliance to the minimum standards listed above.
5. Fire Performance:
 - a. Flame Spread: Class A, ASTM E84.
 - b. Smoke Development: Less than 450, ASTM E84.
 - c. Ignition Temperature: Greater than 650 degree F (350 degree C) above ambient, ASTM D1929.
 - d. Burning Classification: CC1 or CC2, ASTM D635.
 - e. When required for compliance with local building codes, the wall cladding assembly shall show no degradation of the rating of Fire Resistant Assemblies, ASTM E119.

- f. When required for compliance with local building codes, the wall cladding assembly shall meet the performance requirements for Multi Story construction, NFPA 285.
 - g. When required for compliance with local building codes, the wall cladding assembly shall not ignite when exposed to a radiant heat energy source, NFPA 268.
6. Finish Performance: Electron Beam Cure resin in conformance with the following general requirements:
- a. Color: As selected by the architect/engineer from manufacturer's standard colors or a custom color to be matched by the panel supplier.
 - b. Humidity Resistance: No formation of blisters when subjected to condensing water fog at 100% relative humidity and 100 degree F (38 degree C) for 3000 hours, ASTM D2247.
 - c. Salt Spray Resistance: Corrosion creepage from scribe line (1/16 inch (1.6 mm) max.) and minimum blister rating of 8 within the test specimen field, ASTM B117.
 - d. Weather Exposure: Accelerated - 3000 hours in Atlas Type Weatherometer using cycle of 90 minutes light and 30 minutes diminished light and demineralized water with a maximum color change of 5 Delta E units from the original color according to ASTM D2244, with the exception of Uni-Colors A12.3.7 / A18.3.5 / A04.1.7, which will not deviate more than 10 Delta E units from original color according ASTM D2244.
 - e. Color Stability: The decorative surface comply with, classification, 4 - 5 measured with the grey scale according to ISO 105 A02-93 according to test method EN 438-2:29.
 - f. Microbial Characteristics: Will not support micro-organic growth (ISO 846).
- B. Mounting System:
1. Trespa Puramounting system.
 2. Trespa Meteon Concealed mounting system.
- C. Aluminum Sub Structure: Aluminum sub-structure designed to withstand structural loading due to wind load and the dead load of the panel, painted as required to conceal behind the open joinery of the attachment system.
1. Extrusions, including corner closures, joint closures and vent screens, formed members, sheet, and plate shall conform with the recommendations of the manufacturer.
- D. Extruded Aluminum Trim: Color as specified in the finish schedule.
- E. Fasteners (Concealed): Fasteners shall be non-corrosive and as recommended by panel manufacturer. Fasteners shall be concealed.
- F. Panel Corner Profile: Manufacturer's standard for specified flush siding rainscreen.
- 2.4 AIR BARRIER
- A. Air Barrier: See Section 07 27 26.

2.5 INSULATION

- A. Mineral Wool: See Section 07 21 00.

2.6 FABRICATION

- A. Panels: Solid phenolic impregnated kraft paper wall panels with no voids, air spaces or foamed insulation in the core material. Accessory items in accordance with manufacturer's recommendations and approved submittals
 1. Panel Weight: 8 mm (2.4 lb/sq ft), 10 mm (3 lb/sq ft), 13 mm (3.8 lb/ sq ft).
 2. Panel Bow: = 2 mm / m (= 0.079 inch/39.38 inches).
- B. Panel Dimensions: Field fabrication shall be allowed where necessary, but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible.
- C. Appearance: Panel lines, breaks, and angles shall be sharp, true, and surfaces free from warp and buckle

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Confirm exterior sheathing is plumb and level, with no deflection greater than 1/4 inch (6 mm) in 20 feet (6096 mm).
- B. Examine alignment of backup structure prior to installing sub-frame.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 FLASHING INSTALLATION

- A. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10-feet (3 m) with no joints allowed within 24-inches (600 mm) of corner or intersection.
- D. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked

flanges, not less than 1-inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.3 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align rainscreen units within installed tolerance of 1/4-inch in 20-feet (6 mm in 6 m), non-cumulative, on level, plumb, and location lines as indicated and within 1/16-inch (1.5-mm) offset of adjoining faces and of alignment of matching profiles.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Water Penetration: Test areas of installed system indicated on Drawings for compliance with system performance requirements according to ASTM E1105 at minimum differential pressure of 20 percent of inward-acting, wind-load design pressure as defined by SEI/ASCE 7, but not less than 6.24 lbf/sq. ft. (300 Pa).
- C. Water-Spray Test: After completing the installation of 75-foot- (23-m-) by-2-story minimum area of phenolic wall panel assembly, test assembly for water penetration according to AAMA 501.2 in a 2-bay area directed by Architect.
- D. Rainscreen will be considered defective if it does not pass tests and inspections.
- E. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

END OF SECTION 07 4253

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SECTION 07 46 21 - EQUIPMENT SCREENS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Preformed metal panel system to screen roof-mounted equipment.
 - 1. Perforated Panel System.
- B. Installation of steel support members.
- C. Related Section:
 - 1. Section 05 5000 Metal Fabrications.
 - 2. Section 09 0600 Schedules for Finishes.

1.2 REFERENCE STANDARDS

- A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.
- B. ASTM A653/A653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- C. AMCA 500 - (Air Movement Council Association) Test Method for Louvers, Dampers and Shutters.
- D. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate
- E. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes

1.3 SYSTEM DESCRIPTION

- A. System: Preformed metal panels of profiles specified.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate dimensions, layout, joints, construction details, and methods of anchorage. Indicate all loads imposed on the roof structure.
- B. Provide structural calculations, signed and stamped by the manufacturer's licensed structural engineer licensed in California for the entire manufactured screen product.
- C. Three samples of siding illustrating finish color, sheen and texture.

1.5 QUALITY ASSURANCE

- A. Qualifications
 - 1. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five years experience.

2. Installer: Company specializing in performing the Work of this section with minimum three years experience.

B. Mock-up

1. Provide under provisions of Division 01, General Requirements.
2. Provide mock-up of equipment screen system to illustrate component assembly including panel materials, and attachments.
3. Mock-up may remain as part of the Work.

C. Pre-installation Conference

1. Convene two weeks prior to commencing Work of this section.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- C. Stack pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- D. Prevent contact with materials that may cause discoloration or staining.

1.7 FIELD MEASUREMENTS

- A. Verify field measurements.

1.8 COORDINATION

- A. Coordinate Work of Section 05 5000 for installation of substrate and support members.

1.9 WARRANTY

- A. Provide under provisions of Division 01, General Requirements.
- B. Material Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the warranty include structural performance.
 1. Warranty Period: Ten (10) years from date of Substantial Completion.
- C. Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish, including flaking or peeling from approved primed metal substrate, chalk in excess of 8 when tested in accordance with ASTM D4214, Method A, and /or color fading in excess of 5 ΔE Hunter units on panels when tested in accordance with ASTM D2244.
 1. Warranty Period: Twenty (20) years from date Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products of following manufacturers form basis for design and quality intended.
 - 1. Morin, a Kingspan Group Company, Bristol, CT.
- B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

2.2 SCREEN PANEL SYSTEM

- A. Material:
 - 1. Aluminum: Coil stock meeting ASTM B209; Alloy and temper as required for forming operations.
 - 2. Thickness: 0.040 inch.
- B. Screen Panel:
 - 1. Panel Width: 12 inches
 - 2. Profile: MX1.0
 - 3. Panel Thickness: 1-1/2 inch thick
 - 4. Panel Joint: Tongue and Groove Interlock Joint
 - 5. Texture: Perforated
 - a. Perforation Pattern; 1/8 inch holes: 30 percent open area - 7/32 inch hole spacing.
- C. Support Framing
 - 1. Shop fabricated ferrous metal items, galvanized G-90 and painted, members as detailed in drawings and specified in Section 05 5000.
 - 2. Carbon Structural Steel: ASTM A36.
 - 3. Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless: ASTM A53.
 - 4. Zinc (Hot-Dip Galvanized) on Coatings on Iron and Steel Products: ASTM A123.
- D. Accessories
 - 1. Fasteners: as recommended by manufacturer.
 - 2. Trims, framing components, panels, flashing: Manufacturer's prefabricated units.
 - a. Trim to be fabricated from same material and material thickness as screen panels. Finish to match screen panels
- E. Fabrication
 - 1. Form sections true to shape, accurate in size, square, and free from distortion or defects.
 - 2. Form pieces in longest practical lengths.
 - 3. Form panels for interlocking seams.
- F. Finish
 - 1. Exposed Exterior Surfaces: 1.5 mil Fluoropolymer (PVDF) Three Coat System: 0.2 mil primer with 0.8 mil Kynar 500 (70%) Color coat and 0.5 mil clear coat.
 - 2. Colors: Architect to select from full range manufacturer's colors

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify substrate framing.
- B. Verify that building framing members are ready to receive panel system.

3.2 INSTALLATION

- A. Install metal siding system on framing members in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
- C. Fasten siding to structural supports; aligned, level, and plumb.

3.3 TOLERANCES

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.4 CLEANING

- A. Remove site cuttings from finish surfaces.

END OF SECTION

SECTION 07 54 23 – THERMOPLASTIC-POLYOLEFIN ROOFING

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 SECTION INCLUDES

- A. Adhered thermoplastic membrane roofing system
- B. Roof Insulation
- C. Roofing Membrane System at Dead Level Concrete Roof, Mechanical Wells, low sloped roof : Self-adhering vapor retarder over the primed dead level concrete roof decks, followed by 8.75 inch thickness EPS insulation boards adhered, followed by adhered 1/4 inch per foot tapered EPS insulation board crickets, followed by adhered 1/4 inch thick pre-primed gypsum roof board cover board, followed by adhered 115 mils TPO fleeceback roofing membrane.
- D. Roofing Membrane System at Valley Lines of Standing Seam Metal Roof Decks:
 - 1. 8.75 inch thickness EPS insulation boards mechanically fastened to the one inch per foot sloped metal roof decks.
 - 2. Tapered EPS insulation board crickets consisting of two applications of 1/2 inch per foot tapered EPS insulation boards adhered, followed by one application of 1/4 inch per foot tapered EPS insulation boards adhered.
 - 3. Adhered 1/4 inch thick pre-primed gypsum roof board cover board.
 - 4. Adhered 135 mils TPO fleeceback roofing membrane.
- E. Leak test TPO membrane using Electronic Leak Detection as per ASTM D7877 and manufacturer's requirements.
- F. Mechanically fastened, 5/8 inch thick pre-primed gypsum roof board substrate board at framed curbs, walls and parapets that will receive TPO membrane flashing.
- G. Adhered TPO membrane flashing systems at curbs, walls, parapets, equipment pads and penetrations.
- H. TPO clad sheet metal flashings.
- I. TPO walkpads to provide access from roof hatch to equipment, sections of roof requiring maintenance.

1.3 RELATED SECTIONS

- A. Section 06 10 53 – Miscellaneous Rough Carpentry: Wood nailers, curbs, and blocking.
- B. Section 07 21 00 – Building Insulation: Insulation in walls.

- C. Section 07 60 00 - Flashing and Sheet Metal: Metal roof penetration flashings, flashings, and counterflashings.
- D. Section 07 61 00 – Sheet Metal Roofing: Insulation board, self-adhering membrane underlayment and standing seam metal roofing assembly installed following completion of the insulation board, insulation board crickets and TPO roofing membrane system installation at the valley lines of the moderately sloped metal roof decks.
- E. Section 07 92 00 - Joint Sealants.
- F. Division 22: Roof drains.

1.4 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 and glossary of NRCA's (National Roofing Contractors Association) "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- B. Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's (Single Ply Roofing Industry) "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," before multiplication by a safety factor.
- C. Factored Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," after multiplication by a safety factor.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for membrane roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- C. Source Limitations: Obtain components for membrane roofing system from roofing membrane manufacturer.
- D. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E108, for application and roof slopes indicated.

1.6 WARRANTY

- A. Special Manufacturer's Total System Warranty: Manufacturer's standard form, without monetary limitation (no dollar limit), in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials, fabrication, or installation within specified warranty period. Failure includes roof leaks.
 - 1. Special warranty includes roofing membrane, base flashings, roofing membrane, accessories, roof insulation, vapor retarder, fasteners, cover boards, and other components of membrane roofing systems. Special warranty shall also include removal and replacement of paver/pedestal system at exterior roof decks.
 - 2. Warranty Period:
 - a. Roofing System: 20 years from date of Substantial Completion.
 - b. Roof Paver/Pedestal Materials Assembly: 10 years from date of Substantial Completion.
- B. Special Installer's Warranty: Submit roofing Installer's warranty, signed by Installer, covering Work of this Section.
 - 1. Include all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, roof pavers and pedestals, and walkway products, and other components of the roofing systems.
 - 2. Warranty Period: 2 years from date of Substantial Completion.
- C. Special Manufacturer's Warranty: Written warranty, signed by pedestal manufacturer agreeing to repair or replace defective materials that do not comply with requirements or that do not remain free of defects within specified warranty period.
 - 1. Warranty Period: Ten years from date of Substantial Completion.
- D. Special Manufacturer's Warranty: Written warranty, signed by paver manufacturer agreeing to repair or replace defective materials that do not comply with requirements or that do not remain free of defects within specified warranty period.
 - 1. Warranty that pavers will not dish or warp and will not crack, split, or disintegrate in freeze-thaw conditions.
 - 2. Warranty Period: Ten years from date of Substantial Completion.
- E. Special Installer's Warranty: Written waterproofing Installer's warranty, signed by Installer, covering Work of this Section.
 - 1. Warranty includes removing and reinstalling pedestals and pavers on decks.
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

- C. System shall be FM Global approved roofing system with wind uplift performance of 1-90 or better, as calculated per structural drawing loading.
- D. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
- E. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- F. Energy Performance: Complying with California Energy Code, CALGreen and LEED criteria.
 - 1. Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E1980, based on testing identical products by a qualified testing agency.
 - 2. Provide roofing system with initial solar reflectance not less than 0.70 and emissivity not less than 0.75 when tested according to CRRC-1.

2.2 THERMOPLASTIC POLYOLEFIN ROOFING MEMBRANE

- A. Fabric-Reinforced, Fleeceback Thermoplastic Polyolefin (TPO) Sheet: Uniform, flexible sheet formed from a thermoplastic polyolefin, internally fabric or scrim reinforced, and as follows:
 - 1. Manufacturers:
 - a. Basis-of-Design: Carlisle SynTec Inc. - FleeceBACK TPO.
 - 2. Fabric-Reinforced, Fleeceback TPO Membrane Sheet at Tapered Insulation Crickets at Standing Seam Metal Roofs and at exterior roof decks: ASTM D 6878, internally fabric- or scrim-reinforced, fleece-backed, uniform, flexible TPO sheet, for use as roofing membrane and membrane flashing. Carlisle SynTec Inc. - FleeceBACK TPO membrane or equal.
 - a. Thickness: 135 mils nominal.
 - b. Exposed Face Color: White.
 - 3. Fabric-Reinforced, TPO Membrane Flashing Sheet: ASTM D 6878, internally fabric or scrim-reinforced, uniform, flexible TPO sheet, for use as roofing membrane and membrane flashing. Carlisle SynTec Inc. - Sure-Weld TPO reinforced membrane or equal.
 - a. Thickness: 60 mils nominal.
 - b. Exposed Face Color: White.
 - 4. Fabric-reinforced, 80 mils thick, 12 inches wide, TPO membrane sheet cover strips (white) at roofing membrane side and end laps; at exterior roof decks.
 - 5. Fabric-reinforced, 80 mils thick, 6-inches wide, TPO membrane sheet cover strips (white) at roofing membrane end laps and valley lines of standing seam metal roof decks.
- B. Physical Properties:
 - 1. Breaking Strength: ASTM D751; grab method 220 lbf (1 kN).
 - 2. Elongation at Break: ASTM D751; 15 percent.
 - 3. Tearing Strength: ASTM D751; Procedure B, 55 lbf (245 N) minimum.
 - 4. Brittleness Point: Minus 22 deg F (30 deg C).

5. Ozone Resistance: ASTM D1149; No cracks after sample, wrapped around a 3-inch- (75-mm-) diameter mandrel, is exposed for 166 hours to a temperature of 104 deg F (40 deg C) and an ozone level of 100 pphm (100 mPa).
6. Resistance to Heat Aging: ASTM D573; 90 percent minimum retention of breaking strength, elongation at break, and tearing strength after 166 hours at 240 deg F (116 deg C).
7. Water Absorption: ASTM D471; Less than 3 percent mass change after 166 hours' immersion at 158 deg F (70 deg C).
8. Linear Dimension Change: ASTM D1204; Plus or minus 1 percent.

2.3 ROOF INSULATION

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. EPS Board Insulation: ASTM C578, Type II, Cellular Polystyrene Thermal Insulation, 1.5 lb/ft³ nominal density
 1. Basis of Design: Carlisle SynTec Inc. Insulfoam II (4.17 R-Value/inch)
 2. Board Width: Maximum width as required for application; maximum 4 ft x 4 ft where adhered.
 - a. Provide 8.75 inch thickness of insulation board over the low-sloped concrete roof decks and 8.75 inch thickness of insulation board at the valley lines of the standing seam metal roof decks.
 - b. Provide 8.75 inch thickness of insulation board over the low-sloped concrete roof decks and 6 inch thickness of insulation board at the valley lines of the standing seam metal roof decks.
 3. Facing: Black (non-asphaltic) glass fiber-reinforced face both sides.
 4. Flame Spread Rating: 20 or less.
- C. Tapered EPS Insulation Board:
 1. At dead level concrete roof decks (except for exterior roof decks with paver/pedestal assembly), provide factory-tapered insulation boards fabricated to slope of 1/4 inch per foot, installed over the uniform thickness insulation boards, in order to provide the primary roof slope.
 2. Provide factory-tapered insulation boards fabricated to slope of 1/2 inch per 12 inches, over the underlying insulation boards, for construction of tapered insulation crickets at the dead level and low-sloped concrete roof decks.
 3. Provide factory-tapered insulation boards fabricated to slope of 1/2 inch per 12 inches (two applications) and 1/4 inch per 12 inches (one application); for construction of tapered insulation crickets at the valley lines of the standing seam metal roof decks.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
 1. ASTM C208, non-asphaltic, 1" thick x 18" wide wood fiber tapered edge strips at drain sumps as shown on the Drawings.
 2. 1/2 inch thick by 6 inches wide wood fiber tapered edge strips at tapered insulation cricket valley lines at concrete decks and 1-1/2" thick x 12" wide at valley lines of standing seam metal roof decks.

2.4 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal plates corrosion-resistant, designed for fastening roof insulation to metal deck substrate, and acceptable to roofing system manufacturer.

2.5 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
 - 1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
- B. Concrete Primer: Carlisle CAV-GRIP III Low-VOC Adhesive/Primer, or equal.
- C. Self-Adhering Membrane Vapor Retarder at Concrete Roof Decks: Carlisle VapAir Seal 725TR or equal.
- D. Vapor Retarder T-Joint Sealant: Carlisle Sure-Seal EPDM lap sealant or accepted equivalent.
- E. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 60 mils thick, minimum, of same color as TPO membrane sheet.
- F. Conductive Primer over Gypsum Roof Board Cover Board : Detec TruGroundConductive Primer or accepted equivalent.
- G. Prefabricated Pipe Flashings: Supplied by the roof membrane manufacturer, 60 mils thick, minimum, of same color as TPO membrane sheets.
- H. Insulation Board, Gypsum Roof Board and TPO Fleece-Back Membrane Adhesive: Two-component, construction-grade low-rise polyurethane adhesive - Carlisle Flexible FAST Adhesive, or equal.
- I. Membrane Flashing Adhesive: Full coverage adhesive supplied by the roofing membrane manufacturer, low VOC.
- J. Membrane Cleaner: Supplied or approved by the roofing membrane manufacturer.
- K. Membrane Flashing Termination Sealer (water cut-off mastic): Supplied by the roofing membrane manufacturer.
- L. Sealant: Supplied by the roofing membrane manufacturer.
- M. Pressure Sensitive Flashing For Use at the Top of Tube Steel Post Penetrations: White EPDM, 6 inches wide, pressure sensitive uncured flashing & uncured flashing primer; supplied by the roofing membrane manufacturer.

- N. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.
- O. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick (25 mm wide by 1.3 mm thick), prepunched.
- P. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.
- Q. Neoprene Pad: 1/4 inch thick by minimum 1 inch wide solid neoprene pad.
- R. TPO-clad sheet metal supplied by the roofing membrane manufacturer, of same color as TPO membrane sheets.
- S. TPO T-Joint Covers: 60-mil thick non-reinforced TPO membrane supplied by the roofing membrane manufacturer, of same color as TPO membrane sheets.
- T. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories. Sheet materials to be of same color as TPO membrane sheets.

2.6 GYPSUM ROOF BOARD AND ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.
- B. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
- C. Cover Board: Conforming to ASTM C 1177/C 1177M or ASTM C1278, glass-mat, water-resistant gypsum substrate, 1/4-inch thick typical.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Georgia-Pacific Corporation; Dens Deck Prime Roof Board.
 - b. USG Corporation; Securock Gypsum-Fiber Roof Board.
- D. Gypsum Roof Board Substrate Board at Steel-Framed Perimeter Curbs, Walls and Parapets: Roof sheathing conforming to ASTM C 1177/C 1177M or ASTM C1278 and approved for use in the specified roofing system; 5/8 inch thick water-resistant gypsum substrate.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Georgia-Pacific Corporation; Dens Deck Prime Roof Board.
 - b. USG Corporation; Securock Gypsum-Fiber Roof Board.
 - 2. Fasteners for Attachment of Gypsum Roof Boards to Steel Wall Framing: Corrosion resistant, No. 6 by minimum 1.25 inches long, self-tapping, Type S bugle head screws, approved by the gypsum roof board manufacturer.

2.7 WALKPADS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads.
 - 1. Colors and Textures: White
 - 2. Product: TPO heat-weldable traffic pads supplied by roofing membrane manufacturer.
 - 3. Contractor shall coordinate and provide walkpads as required to provide pathway to installed equipment requiring access and maintenance.

PART 3 - EXECUTION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263, or as required by the roofing manufacturer.
- B. Electronic Leak Detection:
 - 1. Leak test the TPO membrane at exterior roof decks using Electronic Leak Detection as per ASTM D7877 and manufacturer's requirements.

END OF SECTION 07 54 23

SECTION 07 60 00 - FLASHING AND SHEET METAL

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 SECTION INCLUDES

- A. Metal flashings of the following types:
 1. Metal flashing and counter flashings.
 2. Exposed metal trim/fascia units.
 3. Reglets.
 4. Copings.
 5. Through-wall flashings.
 6. Preformed flashing sleeves.
 7. Equipment support flashings.

- B. Miscellaneous sheet metal accessories.

1.3 RELATED SECTIONS

- A. Section 07 54 23 – Thermoplastic-Polyolefin Roofing.
- B. Section 07 61 00 – Sheet Metal Roofing.

1.4 DEFINITIONS

- A. Steel Sheet Thicknesses: Thickness dimensions, are minimums as defined in referenced ASTM standards for metallic-coated (galvanized) steel sheets. Metal thicknesses indicated below correspond to former gauge thicknesses:
 1. 20 Gauge: 0.040-inch (1.02-mm).
 2. 22 Gauge: 0.034-inch (0.85-mm).
 3. 24 Gauge: 0.028-inch (0.71-mm).
 4. 26 Gauge: 0.022-inch (0.55-mm).

1.5 QUALITY ASSURANCE

- A. Conform to profiles and sizes shown on drawings, and comply with "Architectural Sheet Metal Manual" by SMACNA, for each general category of work required.
- B. Applicator: Applicator who has complete sheet metal flashing and trim work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance and with 5 years minimum experience.

- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
 - 1. Meet with University, Architect, University's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
 - 2. Review methods and procedures related to sheet metal flashing and trim.
 - 3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

- D. Mock-ups: Build mock-ups to demonstrate aesthetic effects and set quality standards for fabrication and installation. Build mock-ups approximately 48-inches long, including supporting construction cleats, seams, attachments, underlayment, and accessories. Do not proceed with the installation until the mock-ups are approved by the Architect in writing.
 - 1. Approved mock-ups may become part of the completed work if undisturbed at the time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Fabricate and install flashings and copings capable of resisting forces for the appropriate wind zone, per Factory Mutual's Loss Prevention Data Sheet 1-49.
- C. Temperature Range: 120 deg F ambient; 180 deg F, material surface.
- D. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the maximum range of ambient and surface temperatures provided above by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of sealant joints, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.
- E. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to the building interior.

2.2 MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 (Z275) coating designation; structural quality, mill phosphatized where indicated for field painting.
 - 1. Prime all surfaces of bonderized metal.
 - 2. Thickness: 18 gauge minimum.

3. Finish: Standard (dull) mill finish; painted unless noted otherwise on Drawings.
 4. Paint: Paint sheet galvanized sheet metal that is not coil-coated.
 5. Do not apply an acrylic passivator coating to galvanized sheet metal schedule to be painted, or remove this coating mechanically before delivery to the project site.
- B. Sheet Membrane Underlayment at Flashings: Self-adhered, cold-applied composite rubberized asphalt sheet membrane consisting of rubberized asphalt bonded to a cross-laminated high-density polyethylene film with primers and seam sealers as required for a complete watertight installation; provide materials compliant with applicable regulations limiting VOCs.
1. Under Sheet Metal and Flashing: Minimum 40-mil thick, high temperature self-adhering, polymer-modified, bituminous sheet membrane, complying with ASTM D1970
- C. Bedding Compound: Rubber-asphalt type.
- D. Plastic Cement: Asphaltic base cement.
- E. Solder:
1. For Zinc-Coated (Galvanized) Steel Sheet: ASTM B32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
- F. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide elastic, non-sag, nontoxic, non-staining tape.
- G. Sealant: Type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight; see Section 079200.
- H. Flux: FS O-F-506.
- I. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- J. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- K. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187.
- L. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329 or Series 300 stainless steel.

2.3 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Drawbands: Stainless steel.
- B. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated.
 1. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers and with channel for sealant at top edge.
 2. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
 3. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 4. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.4 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop) and Fascia Caps: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Furnish with 6-inch- (150-mm-) wide joint cover plates.
 1. Galvanized Steel: 0.028 inch (0.71 mm).
- B. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Fabricate 1-inch drive joints at the coping joints of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
 1. Vertical Face of Copings: Bottom edge formed outward 1/4- to 1/2-inch, hemmed to form a drip.
 2. Coping Profile: As indicated on Drawings.
 3. Galvanized Steel: 0.040 inch (1.02 mm).
 4. Finish: Painted.

2.5 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in maximum 96-inch- (2400-mm-) long sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6-inches (150 mm) beyond each side of wall openings. Form with 2-inch- (50-mm-) high end dams where flashing is discontinuous.
 1. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
 2. Fabricate through-wall flashing with sealant stop, unless otherwise indicated. Fabricate by bending metal back on itself 3/4-inch (19 mm) at exterior face of wall and down into joint 3/8-inch (10 mm) to form a stop for retaining sealant backer rod.

3. Metal Flashing Terminations: Fabricate from galvanized steel. At exterior face of wall, bend metal back on itself for 3/4-inch (19 mm) and down into joint 3/8-inch (10 mm) to form a stop for retaining sealant backer rod.
4. Fabricate from the following:
 - a. Galvanized Steel: 0.022 inch (0.56 mm) thick.

2.6 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from galvanized steel 0.0276-inch (0.7 mm) thick.

2.7 FINISHES

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

2.8 FABRICATION

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop-fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal with flat-lock seams; solder with type solder and flux recommended by manufacturer, except seal aluminum seams with sealant and, where required for strength, rivet seams and joints.
- C. Fabricate sheet metal flashing and trim in thickness and weight needed to comply with performance requirements, but not less than that specified for each application of metal.
- D. Fabricate corners, transitions, and terminations as a single unit; extend a minimum of 4-inches and a maximum of 8-inches in any direction.
- E. Fabricate cleats and attachment devices from the same material as the accessory being anchored or from a compatible, non-corrosive metal. The thickness of these cleats and attachment devices should be as recommended by SMACNA's 'Architectural Sheet Metal Manual' and Factory Mutual's Loss Prevention Data Sheet 1-49 for the given application, but not less than the thickness of the metal being secured.
- F. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- G. Coat backside of fabricated sheet metal with 15-mil sulfur-free bituminous coating, SSPC-Paint 12, where required to separate metals from corrosive substrates, including cementitious materials, wood or other absorbent materials; or provide other permanent separation.
- H. Provide for thermal expansion of running sheet metal work by overlaps of expansion joints in fabricated work. Where required for watertight construction, provide hooked flanges filled with polyisobutylene mastic for 1-inch embedment of flanges.

- I. Space expansion joints at intervals of not more than 50-feet. Conceal expansion provisions where possible.
- J. Roof-Penetration Flashing: Fabricate from the following material:
 - 1. Galvanized Steel: 0.0276-inch (0.7 mm) thick.

2.9 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from galvanized steel 0.0276-inch (0.7 mm) thick.

2.10 FINISHES

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

PART 3 - EXECUTION

- A. Provide for thermal expansion and building movements.
- B. Comply with recommendations of "Architectural Sheet Metal Manual" by SMACNA.

END OF SECTION 07 60 00

SECTION 07 61 00 – SHEET METAL ROOFING

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 SECTION INCLUDES

- A. Provide standing seam metal roofing assembly at designated locations over moderately sloped steel roof decks, consisting of steel C-channels at perimeter edges and at valley terminations, EPS insulation boards; pre-primed gypsum roof board cover board; high temperature, butyl based self-adhering membrane underlayment; and mechanically seamed standing seam metal roofing system; including fasteners, roof clips with bearing plates sized and located to coordinate with photovoltaic panel system attachment, cleats, trim, flashings, sealants and accessories; UL Class A, UL-90, Title 24, CALGreen and LEED Cool Roof compliant.
- B. Provide mechanically fastened, pre-primed gypsum roof board at vertical surfaces to receive self-adhering membrane underlayment.
- C. Provide pre-manufactured EPDM penetration flashings with integral aluminum flange, sealant and fasteners at fall restraint post penetrations; as shown on the Drawings and as specified herein. The fall restraint post penetrations shall be located centered between the standing seams of the metal roofing.
- D. Miscellaneous trim, flashing, closures, drip flashing, and accessories.
- E. Sealant.
- F. Fastening devices.

1.3 RELATED SECTIONS

- A. Section 05 12 00 - Structural Steel Framing: Structural support of sheet metal roofing.
- B. Section 05 40 00 - Cold-Formed Metal Framing: Secondary support framing supporting sheet metal roofing.
- C. Section 07 54 23 – Thermoplastic-Polyolefin Roofing: Crickets for sheet metal roofing.
- D. Section 07 60 00 - Flashing and Sheet Metal: Flashings, and other sheet metal work not part of sheet metal roofing.
- E. Section 07 92 00 - Joint Sealants: Field-applied sheet metal roofing sealants.

1.4 SYSTEM PERFORMANCE

- A. General: Provide installed metal roofing system that remains watertight; does not permit the passage of water; and resists the specified uplift pressures, thermally induced movement and exposure to weather without failure.
- B. Fire Resistance Requirements:
 - 1. Class A.
 - 2. Test method: ASTM E108 and UL 790.
- C. Wind Loads: See Performance requirements in Part 2 of this Section.

1.5 SYSTEM DESCRIPTION

- A. Design Criteria: Design metal roofing system to withstand loads as required by California Building Code.
 - 1. Design system to provide movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to 100-year seasonal temperature ranges.
 - 2. Design system to accommodate tolerances of structure, provided irregularities do not exceed industry recognized standards and clearances are maintained.
 - 3. Provide for positive drainage of water entering or occurring within preformed metal roofing system.
 - 4. Cool Roof System: Comply with California Title24 requirements for "Cool Roof" system.
 - a. Reflectance: Not less than 0.70 Reflectance.
 - b. Thermal Emittance: Not less than 0.9 Thermal Emittance.
 - c. Label: System to have Cool Roof Rating Council (CRRC) label.
 - 5. Fire Resistance: Conform to California Building Code requirements for Underwriters Laboratory (UL) Roof Fire Hazard classification: Class A Roof system.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in standing seam metal roofing applications. Installer shall have documented successful experience in the installation of roofing systems similar to those specified for this project, and shall be approved by the roofing material manufacturer for installation of their warranted roofing systems.
- B. Manufacturer:
 - 1. Obtain primary metal roofing materials from a single manufacturer.
 - 2. Provide secondary materials as recommended by the manufacturer of primary materials or as otherwise noted in this Specification.
- C. Make all notifications and inspections required by this Specification and regulatory agencies.
- D. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.7 WARRANTY

- A. **Special Site Specific, Full System, Weathertight Warranty:** Special Warranty form in which metal roofing manufacturer agrees to repair or replace components of sheet metal roofing that fail in materials, fabrication, or installation within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures, including but not limited to rupturing, cracking, or puncturing.
 - b. Wrinkling or buckling.
 - c. Loose parts.
 - d. Failure to remain weathertight, including uncontrolled water leakage.
 - e. Deterioration of metals, metal finishes, and other materials beyond normal weathering, including non-uniformity of color or finish.
 - f. Galvanic action between sheet metal roofing and dissimilar materials.
 2. Warranty Period: 20 years from date of Substantial Completion.
- B. **Special Site Specific Warranty on Finishes:** Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 40years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. **General Performance:** Sheet metal roofing system including, but not limited to, metal roof panels, cleats, clips, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, fascia panels, trim, underlayment, and accessories shall comply with requirements indicated without failure due to defective manufacture, fabrication, installation, or other defects in construction. Sheet metal roofing shall remain watertight.
1. Wind Uplift: As required by ASCE 7.
 - a. Panel system shall be ASTM E1592 tested under the supervision of an ANSI or ISO/IEC accredited laboratory and the laboratory shall issue the test report.
 - b. Deflection Limits: Withstand wind loads with deflections no greater than 1/180 of the span.
 2. Air Infiltration: Tested in accordance with ASTM E1680.
 - a. 0.002 cfm per linear foot of joint at static test pressure differential of 12.00 psf.
 3. Water Infiltration Under Static Pressure: Tested with sidelap sealant per ASTM E1646.
 - a. No leakage through panel joints at 20.00 psf.
 4. Water Penetration: No leakage through panel sideseams and endlaps after six hours when tested according to ASTM E2140 at a static water pressure head of 6.00 inches.
 5. Thermal Movements: Accommodate thermal movement without buckling, joint opening, overstressing components, failure of connections, or other detrimental effects, through the following temperature changes:

- a. 120 degrees F, ambient.
 - b. 180 degrees F, material surface.
- 6. Solar Reflectance Index: Title 24, CALGreen and LEED Cool Roof compliant.
- 7. Energy Performance: Provide roof panels that are Title 24, CALGreen and LEED Cool Roof compliant

- B. Structural Performance: Provide engineered metal roofing system capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 - 1. Wind Loads:
 - a. Basic Wind Speed: 115 mph
 - b. Risk Category: III
 - c. Wind Exposure: B.
 - 2. Other Design Loads: As indicated on Drawings.
Deflection Limits: For wind loads, no greater than 1/240 of the span.

- C. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
 - 1. Uplift Rating: UL 90.

- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

- E. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application, assembly, and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- F. Energy Performance: Provide metal roofing with solar reflectance index not less than 78 when calculated according to ASTM E1980 based on testing identical products by a qualified testing agency.

2.2 ROOF SYSTEM

- 1. Description: Two inch high ribs and 180-degree double-lock seam; 16 inch wide zinc coated or aluminum-zinc alloy-steel sheet panels with two pencil ribs per panel and minimum two-coat 70% fluoropolymer exterior finish.
- 2. Material: 22 gauge steel conforming to ASTM A792. Yield strength 50,000 psi; with aluminum-zinc alloy coating conforming to ASTM A792, Class AZ50.
- 3. Panel Width and Pattern: 16 inch wide panels with two pencil ribs per panel.
- 4. Panel Seams: 2 inches high with 180-degree double-lock seam.
- 5. Panel Finish: Provide primer and top finish coat on exposed faces; provide primer and backer coat on concealed faces of panels.
 - a. DuraTech® 5000: Polyvinylidene Fluoride, full 70 percent Kynar 500® or Hylar 5000®, consisting of a baked-on 0.15-0.20 mil corrosion resistant primer and a baked-on 0.70-0.80 mil finish coat with a specular gloss of 8 to 15 when tested in accordance with ASTM D523 at 60 degrees.
 - b. Panel Color: Title 24, CALGreen and LEED Cool Roof compliant and as selected by Architect and approved by Owner.

2.3 MATERIALS

- A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - 1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.
 - 2. Thickness: Minimum 22 gauge.
 - 3. Surface: Smooth, flat finish.
- B. Apply strippable film to the top side of the painted coil to protect the finish during fabrication, shipping and field handling. Remove strippable film before installation.

2.4 FRAMING AND SUBSTRATES

- A. C-Channels at Metal Roofing Perimeter Edges and at Valley Terminations: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
 - 1. C-Channels shall be fabricated using minimum 16 gauge galvanized steel and matching the height of the insulation board/gypsum roof board assembly; and shall be fastened as required to meet wind load requirements for the metal roofing assembly.
- B. Provide 16 gauge galvanized steel nailer strips, fastened to top flanges of steel deck, where required to support secondary framing.
- C. Provide 16 gauge galvanized steel ridge plate, fastened to top flange of C-channel at upslope edge and fastened to metal decking at downslope edge.
- D. EPS Insulation Board: 8.75" thick, See 07 21 00 Building Insulation
- E. Gypsum Roof Board Cover Board: Dens-Deck Prime by Georgia Pacific or approved equal. Provide ¼ inch thickness.
- F. Gypsum Roof Board at Framed Walls: Dens-Deck Prime by Georgia Pacific or approved equal. Provide 5/8 inch thickness.
- G. High Temperature, Butyl Based Self-Adhering Membrane Underlayment: Grace Ultra.

2.5 CLIPS AND FASTENERS

- A. Fasteners for Attachment of Gypsum Roof Boards and Insulation Boards to Steel Deck: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to the insulation board manufacturer. Length sufficient to penetrate through the underside of the steel decking by 1 inch minimum.
- B. Panel Clips: Provide AEP Span Low profile clip with bearing plate designed to allow panels to thermally expand and contract. Clip shall incorporate a self-centering feature to allow 1

inch of movement in both directions along panel length. Clip type shall be selected to meet positive and negative pressures as specified and provided by the metal roof panel manufacturer.

- C. Fasteners: Corrosion-resistant and as recommended by the metal roof panel manufacturer for performance indicated.

2.6 ACCESSORIES

- A. Trims and Flashings: Material, metal thickness, and finish to match panels. Profiles indicated in Drawings.
 - 1. Provide manufacturer's standard accessories and other items essential to completeness of standing seam roof installation.
 - 2. Closures: Provide closures at eaves, ridges, rakes and corners; fabricated of same metal as metal panels.
- B. Pre-manufactured Flashings at Fall Restraint Post Penetrations: Dektite EPDM Pipe Flashing. Use the smallest size pipe flashing that is approved by the pipe flashing manufacturer for the sizing of the pipe outside diameter. Provide ¼ x 14 x 1-1/8" Scots Teks 1 corrosion resistant screws with stainless steel/EPDM weathertight washers, or equal.
- C. Panel Penetration Flashings: As recommended by panel manufacturer; designed to provide sufficient movement to prevent creation of points of fixity at penetrations.
- D. Sealant for Field Application: high grade non-curing butyl or curing urethane sealant as recommended by panel manufacturer.
- E. Sealant Tape for Field Application: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape minimum, 1/2 inch wide and 1/8 inch thick.

2.7 FABRICATION

- A. General: Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions (pan width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate sheet metal roofing and accessories at the shop to greatest extent possible.
 - 1. Unless otherwise shown on Drawings or specified herein, fabricate panels in continuous lengths and fabricate flashings and accessories in longest practical lengths.
 - 2. Panels shall be factory correctively-leveled.
- B. Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks, true to line and levels indicated, and with exposed edges folded back to form hems.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate to comply with manufacturer's recommendations, the Drawings and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
- F. Lay out sheet metal roofing so cross seams, when required, are made in direction of flow with higher pans overlapping lower pans. Stagger cross seams.
- G. Fold and cleat eaves and transverse seams in the shop where system allows.
- H. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements shown and as required for leakproof construction.
- I. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1-inch (25 mm) deep, filled with sealant (concealed within joints).
- J. Sealant Joints: Where movable, non-expansion-type joints are indicated or required to produce weathertight seams, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.
- K. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturers of dissimilar metals or by fabricator.
- L. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.
 - 1. Hem all exposed edges of flashing on underside, 1/2-inch.
 - 2. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 3. Seams: Fabricate non-moving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 4. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.
- M. Do not use graphite pencils to mark metal surfaces containing aluminum.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.
- C. The Owner reserves the right to inspect all phases of the work. If defective or deficient work is noted, the Owner reserves the right to direct the Contractor to stop additional Work until such defective or deficient work is corrected.

END OF SECTION 07 61 00

SECTION 07 72 00 – ROOF ACCESSORIES

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 SECTION INCLUDES

- A. Prefabricated roof hatches, with integral support curbs, operable hardware, and counterflashings.
- B. Prefabricated roof ladders and cages.
- C. Roof hatch safety posts.
- D. Ship ladders

1.3 RELATED SECTIONS

- A. Section 05 50 00 – Metal Fabrications: Shop-fabricated ladders.
- B. Section 06 10 53 - Miscellaneous Carpentry: Wood curbs.
- C. Section 07 60 00 - Flashing and Sheet Metal: Counter flashing to roof system.

1.4 QUALITY ASSURANCE

- A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-design: Precision

2.2 ROOF HATCH

- A. Performance Characteristics:
 - 1. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m²) with a maximum deflection of .67% of the span and a 20 psf (97kg/m²) wind uplift for galvanized steel (Model PH-G) and aluminum (Model PH-A) roof hatches.
 - 2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.

3. Operation of the cover shall not be affected by temperature. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
- B. Framing: Formed or extruded aluminum, mill finish.
- C. Curb: Insulated double wall, integral curb.
1. Formed from 14 gauge galvanized steel of lock forming quality per ASTM A-525 with G90 coating (.090 Aluminum H-14 3003 on aluminum models).
 2. Sheathed with 1" of rigid fiber board insulation.
 3. Height of 12" unless indicated otherwise on drawings.
 4. 4" integral flange for securing to roof.
 5. Hinges connecting curb to door shall be 1/8", 2 piece formed steel with 3/8" pivot pin.
 6. Extruded rubber gasket within a 20 gauge extruded aluminum track shall be securely attached to the frame to make the unit weathertight.
- D. Cover:
1. Formed from 14 gauge galvanized steel of lockforming quality per ASTM A-525 with G90 coating (.090 Aluminum H-14 3003 on aluminum models).
 2. Liner shall be 22 gauge galvanized steel with G90 coating (.040 Aluminum H-14 3003 on aluminum models).
 3. Insulation between cover and liner to be 1" thick U.L. plain fiberglass 0.75# density.
 4. Lid shall be reinforced as required with 11 ga. steel channel (.090 Aluminum H-14 3003 on aluminum models).
 5. A one point cab lock is to be provided with a built-in inside handle on units with a length of 4' 6" or less. On units of greater length, a 2 point slam lock will be used.
 6. Exterior of cover shall be devoid of hardware with the exception of the outside handle.
 7. Outside handle shall be vinyl coated, steel T-handle
 8. Automatic hold-open device shall be formed from 3/16" steel flat bar and 1/2" diameter steel round stock with a vinyl grip.
 9. Padlock provisions provided on both interior and exterior of unit.
 10. Extruded rubber gasket shall be securely attached to the liner, thus providing a weather-tight seal.
- E. Pressure Control
1. Opening/closing assistance/resistance shall be provided with spring-loaded pressure intensifiers consisting of a telescoping tube; the top (outer) tube shall be 1 5/16", bottom (inner) tube shall be 1 1/2". Tubes shall be cadmium plated and chromate-sealed.
- F. Hardware
1. Corrosion resistant hardware and fasteners
 2. Compression spring operator enclosed in telescopic tubes;
 3. Positive snap latch pull handle for interior and exterior operation;
 4. Automatic hold open arm with vinyl covered grip handle for easy release and hand control of the cover to its closed and latched position.
 5. Components zinc plated and chromate sealed, mill finish;
 6. Padlock hasps inside and outside.
 7. Heavy duty pin type hinge

- G. Unit: Unless otherwise noted or required by Authority Having Jurisdiction, 36 by 36 inch size, single leaf type single leaf type; single leaf type; insulated lid and integral support curb; complete with integral counterflashings to roof flashing system and flanges on support curb for anchorage to roof deck.

2.3 LADDER SAFETY POST AND SAFETY RAILINGS

- A. Safety Railing System: Manufacturer's standard complete system including rails, clamps, fasteners, safety barrier at railing opening, and all accessories required for a complete installation.
1. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
 2. Fabricate joints that will be exposed to weather in a watertight manner.
 3. Close exposed ends of handrail and railing members with prefabricated end fittings.
 4. Fasteners: Manufacturer's standard.
- B. Post: High strength square steel tubing. Provide a pull up loop at the upper end of the post to facilitate raising the post.
1. At Folding Stairway: Provide swing-up safety grab post, safety yellow color; Best Materials, or approved equal.
- C. Performance Characteristics:
1. Tubular post: Automatic locking mechanism when fully extended.
 2. Controlled upward and downward movement.
 3. Release lever shall disengage the post to allow it to be returned to its lowered position.
 4. Adjustable mounting brackets to fit ladder rung spacing up to 14" oc and clamp brackets to accommodate ladder rungs up to 1-3/4" diameter.
- D. Balancing Spring: Stainless steel balancing mechanism that provides smooth, easy, controlled operation when raising and lowering safety post.
- E. Hardware: Type 316 stainless steel.
- F. Post Finish: Hot-dip galvanized steel.

2.4 ROOF LADDERS

- A. Pre-fabricated Ladder: fixed access ladder.
1. Space siderails 18 inches (457 mm) apart unless otherwise indicated.
 2. Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches (64 mm) deep, 3/4 inch (19 mm) wide, and 1/8 inch (3.2 mm) thick.
 3. Rungs: Extruded-aluminum tubes, not less than 3/4 inch (19 mm) deep and not less than 1/8 inch (3.2 mm) thick, with ribbed tread surfaces.
 4. Fit rungs in centerline of siderails; fasten by welding or with stainless-steel fasteners or brackets and aluminum rivets.
 5. Support each ladder at top and bottom and not more than 60 inches (1500 mm) oc with welded or bolted aluminum brackets.
 6. Provide minimum 72-inch- (1830-mm-) high, hinged security door with padlock hasp at foot of ladder to prevent unauthorized ladder use.

7. As-Fabricated Finish: AA-M12.

2.5 ROOF LADDER FABRICATION

- A. Fabricate components free of visual distortion or defects. Weld corners and joints fully.
- B. Provide for removal of condensation occurring within components or assembly.
- C. Fit components for weathertight assembly.

2.6 SHIPS LADDER

- A. Aluminum Ships Ladder
 - 1. Capacity: Unit shall support a 1000 lb (454 kg) total load without failure.
 - 2. Degree of Incline: 70 degrees per OSHA requirements.
- B. Components: Ladder, mounting brackets and handrails on both sides.
 - 1. Ladder Stringer: 5 inch by 2 inch by 3/16 inch (127 mm by 51 mm by 5 mm) extruded 6005-T5 aluminum channel.
 - 2. Ladder Treads: 5-3/16 inch by 1-1/8 inch by 1/8 inch (131 mm by 29 mm by 3 mm) extruded 6005-T5 aluminum with serrated slip resistance surface standard. 1-1/4 inch by 1-1/4 by 1-1/4 inch angle welded to underside of treads. Treads shall be welded and bolted to stringer with 1/4" stainless steel bolts.
 - 3. Ladder Mounting Brackets:
 - a. Floor Brackets: 2 inch by 3 inch by 1/4 inch (51 mm by 76 mm by 6 mm) aluminum angle.
 - b. Top Bracket: 4-3/4 inch by 5 inch by 1/4 inch (121 mm by 127 mm by 6 mm) aluminum angle.
 - 4. Handrails: 1-1/4 inches (32 mm) Schedule 40, 6005-T5 aluminum pipe provided with internal aluminum fittings.
- C. Platform:
 - 1. Surface: Platforms 9 Sq Ft or less shall be made of standard tread material. Platforms larger than 9 Sq Ft shall have a bar grating surface.
 - 2. Toe Boards: 4 inch by 1/4" 6005 T-5 aluminum.
 - 3. Handrails: 1-1/4 inches (32 mm) Schedule 40, 6005-T5 aluminum pipe provided with internal aluminum fittings.
- D. Finishes: Powder coated; color TBD.

2.7 PREFABRICATED CURBS AND EQUIPMENT SUPPORTS

- A. Prefabricated Curb and Equipment Support Units:
 - 1. Type: Designed for roof type and equipment.
 - 2. Materials: Steel, 14-gauge (.0747 inch), baked enamel finish.
 - 3. Materials: Steel, 14-gauge (.0747 inch), hot dip galvanized.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 07 72 00

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SECTION 07 84 00 – FIRESTOPPING

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 SECTION INCLUDES

- A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items for the following, including at entrance and exit of the Project area:
 - 1. Penetrations through fire-resistance-rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 2. Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 3. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
 - 4. Sealant joints in fire-rated construction.

1.3 RELATED SECTIONS

- A. Section 07 92 00 – Joint Sealants: Electrical and pipe penetration, acoustical and fire sealants at walls.

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility for Materials: Obtain firestopping materials from one manufacturer for entire Project.
 - 1. This does not restrict Contractor from subcontracting installation of firestopping to multiple subcontracts, but does require installers to use the same manufacturer throughout the Project and be licensed by that manufacturer for the installation of firestopping.
- B. Firestopping materials and systems shall be listed and labeled in accordance with requirements of Underwriters Laboratories, Inc. (UL) Building Materials Directory.
- C. Firestopping materials shall conform to California Building Code (CBC) for fire resistance standards and requirements for penetrations in walls, partitions, and floor/ceiling and floor/roof assemblies.
- D. Firestopping materials shall comply with ASTM E814 and UL 1479.
- E. Firestopping sealants shall comply with ASTM C719 and ASTM C920.

- F. Form materials to remain in place in the completed work and sealant used for firestopping work shall be UL listed and labeled.
- G. Firestopping materials shall be rated as required when tested in accordance with ASTM E119.
- H. Firestopping materials shall be asbestos free and shall not incorporate nor require the use of hazardous solvents.
- I. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surface.
- J. Installer shall have a minimum of 5-years' experience installing UL listed firestopping systems in similar type construction.
 - 1. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements.
 - 2. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.
- B. Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.
- C. Provide firestop sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.
- D. Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.
- E. Fire rated pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur.
- F. When mechanical cable pathways are not practical, openings within walls and floors designed to accommodate voice, data and video cabling shall be provided with re-enterable products specifically designed for retrofit.
- G. Penetrants passing through fire-resistance rated floor-ceiling assemblies contained within chase wall assemblies shall be protected with products tested by being fully exposed to the fire outside of the chase wall. Systems within the UL Fire Resistance Directory that meet this criterion are identified with the words "Chase Wall Optional".

- H. Provide fire-resistive joint sealants designed to accommodate a specific range of movement and tested for this purpose in accordance with a cyclic movement test criteria as outlined in Standards, ASTM E1399/E1399M, ASTM E1966 or ANSI/ UL 2079.
- I. Provide penetration firestop systems, fire-resistive joint systems, or perimeter fire barrier systems subjected to an air leakage test conducted in accordance with Standard, ANSI/UL1479 for penetrations and ANSI/UL2079 for joint systems with published L-Ratings for ambient and elevated temperatures as evidence of the ability of firestop system to restrict the movement of smoke.
- J. Provide T-Rating Collar Devices tested in accordance with ASTM E814 or ANSI/UL1479 for metallic pipe penetrations requiring T-Ratings per the applicable building code.
- K. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E814:
 - 1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 - 2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - a. Penetrations located outside wall cavities.
 - b. Penetrations located outside fire-resistance-rated shaft enclosures.
 - c. Where firestop systems protect penetrating items larger than a 4-inch diameter nominal pipe or 16 sq inch overall cross-sectional area.
 - d. Where firestop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.
- L. Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
- M. Fire Rated Construction Design Requirements: Maintain barrier and structural floor fire resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.
- N. Smoke Barrier Construction Design Requirements: Maintain barrier and structural floor resistance to cold smoke at all penetrations, connections with other surfaces and types of construction and at all separations required to permit building movement and sound or vibration absorption, and at other construction gaps.
- O. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 4-inches (100 mm) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.

3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- P. Assembly designs are specified generally under UL system categories by penetrating item. Manufacturers' product applications must have specific UL system designations.
- Q. Duct Damper Penetrations: Completely fill annular space with mineral wool safing and seal with flexible firestop sealant. Comply with duct damper manufacturer's requirements.

2.2 MATERIALS

- A. Through-Penetration Firestop Systems: Comply with the following requirements in providing system components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating firestops under conditions of service and application, based on testing and field experience.
- B. Systems or devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, provided that they conform to the construction type, penetrant type, annular space requirements, and fire rating involved in each separate instance, and that the system is symmetrical for wall applications.
1. Provide only asbestos-free systems or devices.
 2. Additional requirements: Prevent the passage of cold smoke either as an inherent property of the product, or by the use of a separate product included as a part of the UL system or device, and designed to perform this function.

2.3 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions.
 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
1. Horizontal assemblies include floors, floor/ceiling assemblies, and, ceiling membranes of roof/ceiling assemblies.
 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

- D. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
- E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.
- F. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-wool-fiber or rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.4 FILL MATERIALS

- A. Endothermic, Latex Compound Sealant: Single-component, endothermic, latex formulation.
- B. Intumescent, Latex Sealant: Single-component, intumescent, latex formulation.
- C. Intumescent Putty: Nonhardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.
- D. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- E. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

2.5 SEALANTS

- A. Silicone Sealant: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealant.

- B. Sealant Colors: As selected by Architect from manufacturer's full range of standard colors for products of type indicated.
- C. Single-Component, Neutral-Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, G, A, and (as applicable to joint substrates indicated) O.
- D. Single-Component, Nonsag, Urethane Sealant: Type S; Grade NS; Class 25; and Uses NT, M, A, and (as applicable to joint substrates indicated) O.

2.6 FIRESTOPPING AT ELECTRICAL BOXES AND UTILITY OUTLETS

- A. Sealant for 1-hour Rated Walls: Nondrying, non-hardening, non-skinning, non-staining, single component fire rated material for through-penetration firestop systems.
 - 1. Specified Technologies Inc., SSP Putty and Putty Pads.
 - 2. 3M Fire Protection Products, Fire Barrier Moldable Putty or Putty Pads.
 - 3. Locations: Steel electrical outlet boxes which exceed 16-square inches.
- B. Utility penetrations in walls, ceilings, or floors requiring protected openings shall be firestopped and sealed with an approved material securely installed, capable of maintaining its integrity when subjected to test temperatures specified in ASTM E814.
- C. Steel electrical outlet boxes on opposite sides of walls requiring protected openings shall be separated by a horizontal distance of 24-inches.
- D. Steel electrical outlet boxes which occur in combination with outlet boxes of any size such that the aggregate area of unprotected outlet boxes exceeds 100-square inches in any 100-square feet of wall area shall be protected by an approved material or detail to decrease the aggregate area of unprotected utility boxes to less than 100-square inches in any 100-square feet of wall.
- E. Utility and electrical outlets or boxes shall be securely fastened to the stud or framing of the wall or ceiling assembly. The opening in the gypsum board shall be cut so that the clearance between the box and the gypsum board does not exceed 1/8-inch.
 - 1. Fill the 1/8-inch gap with an approved fire-rated sealant.

2.7 ACCESSORIES

- A. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
- B. Firestop Devices: Factory-assembled steel collars lined with intumescent material sized to fit specific outside diameter of penetrating item.
- C. Fire Rated Cable Pathways: STI EZ-PATH™ Brand device modules comprised of steel raceway with intumescent foam pads allowing 0 to 100 percent cable fill.

- D. Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film.
- E. Firestop Pillows: Re-enterable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame retardant poly bag.
- F. Composite Sheet: Intumescent material sandwiched between a galvanized steel sheet and steel wire mesh protected with aluminum foil.
- G. Cast-In-Place Firestop Device: Single component molded firestop device installed on forms prior to concrete placement with totally encapsulated, tamper-proof integral firestop system and smoke sealing gasket.
- H. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestop gasket for use on steel HVAC ducts.
- I. Firestop Plugs: Re-enterable, foam rubber plug impregnated with intumescent material for use in blank openings and cable sleeves.
- J. Fire-Rated T Rating Collar Device: Louvered steel collar system with synthetic aluminized polymer coolant wrap installed on metallic pipes where T Ratings are required by applicable building code requirements.
- K. Fire-Rated Cable Grommet: Molded two-piece grommet made from plenum grade polymer with a foam inner core for sealing individual cable penetrations up to 0.27 in. (7 mm) diameter.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 07 84 00

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SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Exterior Joints in Vertical Surfaces and Horizontal Non-traffic Surfaces:
 - 1. At flashing and sheet metal.
 - 2. Construction joints in cast-in-place concrete.
 - 3. Perimeter joints around frames of storefronts, doors, windows, and louvers.
- B. Interior Joints in Vertical Surfaces and Horizontal Non-traffic Surfaces:
 - 1. Control and expansion joints on exposed interior surfaces of exterior walls.
 - 2. Perimeter joints of exterior openings.
 - 3. Tile control and expansion joints.
 - 4. Vertical joints on exposed surfaces of concrete walls and partitions.
 - 5. Interior rated and non-rated sealants.
 - 6. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
 - 7. Perimeter joints between plumbing fixtures and adjoining walls, floors, and counters.
 - 8. Control and expansion joints in ceiling and overhead surfaces.
 - 9. Acoustical joints in wall and ceiling surfaces.
- C. Interior Joints in Horizontal Traffic Surfaces:
 - 1. Isolation joints in cast-in-place concrete slabs.
- D. Joint sealant primers and accessories.

1.3 RELATED SECTIONS

- A. Section 07 60 00 - Flashing and Sheet Metal.
- B. Section 07 42 10.21 - Continuous Insulation (CI) With Composite Framing Support (CFS) System
- C. Section 08 81 00 - Glazing: Sealants used in glazing.
- D. Section 09 29 00 - Gypsum Board: Sealing concealed perimeter joints of gypsum board partitions to reduce sound transmission.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the Work.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated, as documented according to ASTM E548.
 - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
- D. Sealant manufacturer shall confirm in writing that all materials contacting the sealants, including joint backings, gaskets, spacers, and joint substrates, are compatible with the sealant to be installed. Schedule sufficient time to test these materials for compatibility with the sealant, as necessary. Compatibility tests shall be performed to the sealant manufacturer's standards.
 - 1. Determine if priming and/or other preparation techniques are required.
 - 2. Determine compatibility of exterior joint sealant with stone material to be used. Verify that joint sealant oils do not migrate onto stone face causing visual banding while wet or dry. Manufacturer shall perform staining tests of sealant systems in accordance with ASTM C510 and ASTM D2203 methods for each joint substrate condition in the work.
 - 3. Testing for adhesion is not required if sealant manufacturer has performed previous testing of proposed sealants for adhesion to and compatibility with required joints substrates.
- E. Sealant manufacturer shall confirm in writing the appropriate joint preparation and priming techniques required to obtain rapid, acceptable adhesion of the joint sealants to the joint substrates.
- F. Preconstruction Field Testing: Prior to installation of joint sealants, field-test adhesion to all joint substrates and surface types. Field adhesion testing shall be completed and results shall be reviewed and approved by sealant manufacturer and installer before commencing sealant installation.
 - 1. Install joint sealants in 5-foot joint lengths. Allow to cure before testing. Test adhesion by pulling sealant out of joint according to "Method A, Field-Applied Sealant Joint Hand Pull Tab", in Appendix X1 in ASTM C1193. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 2. Perform field tests for each type of elastomeric sealant and joint substrate.
 - 3. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
 - 4. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
 - 5. Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrate during testing.

- G. Pre-Installation Meeting: Review joint application procedures, compatibility tests, adhesion tests, and warranty requirements in a meeting involving installer, manufacturer or manufacturer's representative, City, consultant, and contractor.

1.5 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Exterior Sealants: Furnish a written warranty against leaks or other defects of materials and workmanship. Defects include but are not limited to changes in the structural, physical or chemical properties of the sealant materials that impair function or require abnormal maintenance, changes in surface finish, color or texture, failure in adhesion, weather resistance or durability, failure to prevent entry of water, or failure to comply with specified requirements.
 - 1. Warranty Period: Ten years from date of Substantial Completion.
 - 2. This warranty shall not cover formation of cracks or defects in substrate materials adjacent to the seal, joint movement in excess of movement rating of sealant, or physical damage caused by others.
 - 3. Repair or replace defective materials and workmanship during warranty period without expense to City, including removal and replacement of other items as required.
 - 4. This warranty shall be in addition to and not a limitation of other rights the City may have against the Contractor under the Contract Documents.
- C. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- D. Failure of the materials, applications, and installation include leakage, hardening, cracking, crumbling, melting, shrinkage or running of the sealant or caulking, or the staining of adjacent materials.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.
- C. VOC Content: Provide joint sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.

2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

2.2 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.3 MATERIALS

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect and approved by Owner from manufacturer's full range.
- C. Provide selections made by Architect and approved by Owner from manufacturer's full range of standard colors for products of type indicated.

2.4 EXTERIOR JOINT SEALANTS

- A. Exterior Silicone Weatherproofing and Control Joint Sealant: ASTM C920, also ASTM C1193 and tested under ASTM C719; Type S, Grade NS, Class 100/50, Use NT, M, G, A, and O; single component, low-modulus, non-sag sealant, use at exterior joints in vertical surfaces and non-traffic horizontal surfaces such as but not limited to:
 1. Control and expansion joints in cast-in-place concrete.
 2. Joints between architectural precast concrete units.
 3. Joints in exterior plaster wall systems.
 4. Control and expansion joints in unit masonry.
 5. Butt joints between metal panels.
 6. Joints between different materials listed above.
 7. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers, and similar openings.
 8. Control and expansion joints in ceilings and overhead surfaces.
 9. Other exterior joints in vertical surfaces and non-traffic horizontal surfaces for which no other sealant is specified.
 10. Products: Dow Corning Corporation; Dow Corning 790, Pecora Corporation; 890, Tremco; Spectrem 1, or equal.
- B. Reglets and Flashings Silicone Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, A, and O; single component elastomeric.
 1. Products: Dow Corning Corporation; Dow Corning 795. Pecora Corporation; 895NST, Tremco, Inc.; Spectrem 2.
- C. Exterior Plaster Joint Sealant: ASTM C920, also ASTM C1193 and tested under ASTM C719; Type S, Grade NS, Class 100/50, Use NT, M, G, A, and O; single component, low-modulus, non-sag sealant,
 1. Products: Tremco; Spectrem 3 or Spectrem 4, or equal.

- D. Concrete Walkway Joint Sealant: ASTM C920, Type M and A, Grade P, Class 25, Use T, M, and O; multi-component, pourable urethane sealant.
 - 1. Products: Pecora Corporation; Urexpam NR-200, Sika, Inc. SikaFlex 2c SL, Tremco Incorporated, THC 900/901, or equal.

2.5 INTERIOR JOINT SEALANTS

- A. Interior Weatherproofing and Control Joint Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A, and O; single component, chemical curing, non-staining, non-bleeding, non-sagging type; color as selected; use in interior surfaces such as, but not limited to:
 - 1. Control and expansion joints on exposed interior surfaces of exterior walls.
 - 2. Perimeter joints on exposed interior surfaces of exterior openings.
 - 3. Joints on precast beams and planks.
 - 4. Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefronts, louvers, elevator entrances and similar openings.
 - 5. Other interior joints in vertical surfaces and non-traffic horizontal surfaces subject to movement for which no other sealant is specified.
 - 6. Products: Pecora Corporation; Dynatrol I-XL, Sika Corporation, Inc.; Sikaflex 1a, BASF (Sonneborne); NP 1, Tremco; Dymonic FC., or equal.
- B. Interior Latex Joint Sealant: Provide product complying with ASTM C834, Type S, Use O, Grade NS; use at interior joints in vertical surfaces and non-traffic horizontal surfaces such as, but not limited to:
 - 1. Perimeters of interior door and window frames.
 - 2. Interior wall surfaces scheduled to receive latex paints.
 - 3. Perimeters of plumbing fixtures.
 - 4. Control and expansion joints on exposed interior surfaces of exterior walls.
 - 5. Perimeter joints on exposed interior surfaces of exterior openings.
 - 6. Joints on precast beams and planks.
 - 7. Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefronts, louvers, elevator entrances and similar openings.
 - 8. Trim or finish joints subject to movement.
 - 9. Products: Pecora Corporation; AC-20, BASF (Sonneborn); Sonolac, Tremco; Tremflex 834, or equal..
- C. Mildew Resistant Silicone Sealant: ASTM C920, Type S, Grade NS, Class 25; Use NT, G, fcA, and O; use on non-porous interior surfaces under high humidity and temperature extremes. For use in bathrooms and similar applications where joints need protection against fungi and bacteria.
 - 1. Products: Dow Corning Corporation; Dow Corning 786, Pecora, Inc. 898, Tremco, Inc Tremsil 200., or equal.
- D. Acoustical Sealant for Exposed and Concealed Joints: Non-sag, paintable, nonstaining, latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90; use for drywall or plaster wall systems, bedding electrical boxes and other wall outlets.

1. Products: Pecora Corporation; AIS 919 Acoustical and Insulation Latex Sealant, United States Gypsum Co.; SHEETROCK Acoustical Sealant, Tremco, Inc.; Tremflex 834 or Tremco Acoustical Sealant., or equal.

2.6 JOINT SEALANT BACKING

- A. General: Provide sealant backings and accessory materials, including primers, of material and type that are non-staining; are compatible with joint substrates, sealants, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Foam Joint Fillers: Non-gassing, preformed, compressible, resilient, non-staining, non-waxing, non-extruding strips of flexible plastic foam of one of materials indicated below, as recommended by manufacturer for compatibility with their sealant; of size, shape, and density to control sealant depth, prevent three-sided adhesion, provide a surface against which to tool, and otherwise contribute to producing optimum sealant performance:
 1. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) or Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance and as recommended by sealant manufacturer.
 2. Elastomeric Tubing Sealant Backings: Flexible cellular rubber tubing complying with ASTM D1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from pre-construction joint sealant-substrate tests and field tests. Certify that primer will not permanently stain adjacent joint surfaces.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints, to mask off adjacent joint surfaces where sealant is not permanently intended to be applied.
- D. Bondbreaker Tape: Polyethylene pressure sensitive adhesive tape, to be used in areas where backer rod cannot fit and where three-sided adhesion is to be avoided.

PART 3 - EXECUTION (NOT USED)

3.1 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
- E. Install joint backing to maintain the following joint ratios, but in no case less than 1/4 inch (6 mm):
 - 1. Joints up to 1/2 inch wide: 1:1 width to depth ratio.
 - 2. Joints Greater than 1/2 inch wide: 2:1 width to depth ratio; maximum 1/2 inch joint depth.
 - 3. Sub-caulk joints that are deep, or joints without suitable backstop, to proper depth.
 - 4. Protect side walls of joint (to depth of caulking) with bond breaker tape.
 - 5. Install with adhesive on 2 faces in contact with sides of joints.
- F. Tooling of Non-sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C1193, unless otherwise indicated.
 - 4. Provide flush joint configuration where indicated per Figure 5B in ASTM C1193.

3.2 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet (300 m) of joint length for each type of elastomeric sealant and joint substrate.
 - 2. Test Method: Test joint sealants as appropriate for type of joint-sealant application indicated.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
 4. Inspect tested joints and report on the following:
 - a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - b. Whether sealants filled joint cavities and are free of voids.
 - c. Whether sealant dimensions and configurations comply with specified requirements.
 5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 6. Repair sealants pulled from test area by applying sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean.
- B. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

END OF SECTION 07 92 00

SECTION 08 11 13 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Standard steel doors and frames for interior and exterior locations – service doors for storage, mechanical and support spaces.
- B. Fire rated door frames.

1.3 RELATED SECTIONS

- A. Section 08 71 00 - Door Hardware.
- B. Section 09 91 00 – Painting: Finish painting of steel items.

1.4 DEFINITIONS

- A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets. Metal thicknesses indicated below correspond to former gage thicknesses:
 - 1. 20 Gage: 0.032-inch (0.8-mm).
 - 2. 18 Gage: 0.042-inch (1.0-mm).
 - 3. 16 Gage: 0.053-inch (1.3-mm).
 - 4. 14 Gage: 0.067-inch (1.7-mm).
 - 5. 12 Gage: 0.093-inch (2.3-mm).

1.5 QUALITY ASSURANCE

- A. Provide doors and frames complying with Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames", ANSI A250, and as specified herein.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by UL, for fire ratings indicated, based on testing according to NFPA 252. Assemblies must be factory-welded or come complete with factory-installed mechanical joints and must not require job site fabrication.
- C. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by UL, for fire ratings indicated, based on testing according to NFPA 257. Assemblies must be factory-welded or come complete with factory-installed mechanical joints and must not require job site fabrication.

- D. Listings and Labels - Fire Rated Assemblies: Under current follow-up service by Underwriter Laboratory maintaining a current listing or certification. Label assemblies accordance with limits of manufacturer's listing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:
 - 1. Steel: Average recycled content of steel to be a minimum 60 percent recycled content.
- B. VOC Content: Welding and coatings applied on-site on the interior of the building and products used on the interior of the building shall comply with VOC limits as specified in Section 01 8113 - Sustainable Design Requirements.
 - 1. Use materials that have the lowest possible VOC content in units of g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.2 STANDARD STEEL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.
 - 1. Design: Flush panel.
 - 2. Non-Rated Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.
 - 3. Fire Door Core Construction: As required to provide fire-protection ratings indicated.
 - 4. Vertical Edges, for Single- and Double-Acting Doors: Square edge.
 - 5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick end closures or channels of same material as face sheets.
 - 6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance Level 3.
 - 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush) or Model 2 (Seamless) composite construction where indicated on Drawings.
- C. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - 1. Fabricate from cold-rolled steel sheet.
 - 2. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush) or Model 2 (Seamless) composite construction where indicated on Drawings.
 - 3. Material: Steel sheet, 0.042-inch (1.0 mm) thick.

4. Cores: Manufacturer's standard as required for each type of rated and non-rated door and that meets rating requirements.

2.3 STANDARD STEEL FRAMES

- A. General: Comply with ANSI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated from 14 gauge metallic-coated steel sheet.
 1. Fabricate frames with mitered or coped and welded face corners and seamless face joints; shop-primed for field painting.
 2. Frames for Level 1 and Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
 3. Frames for Level 3 and Level 4 Steel Doors: 0.067-inch- (1.7-mm-) thick steel sheet.
- C. Interior Frames: Fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.
 1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
 2. Knocked-Down Frames: Not permitted.
 3. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
 4. Frames for Wood Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
- D. Fire Rated Units: Construct assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing according to NFPA 252.
 1. Frame System: "Fireframes Designer Series by TGP" fire-rated steel frame system
 2. Labels: Place fire rating labels where visible when door frames are in installed, opened position.
 3. Fire Ratings: Refer to Drawings for fire rating requirements.
 4. Temperature Rise Rating: Provide doors with maximum 450°F Temperature Rise Rating in 30 minute fire exposure period at doors into exit enclosures.
- E. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:
 1. Hinges: Minimum 0.123 inch (3.0 mm) thick by 1-1/2 inches (38 mm) wide by 6 inches (152 mm) longer than hinge, secured by not less than 6 spot welds.
 2. Pivots: Minimum 0.167 inch (4.2 mm) thick by 1-1/2 inches (38 mm) wide by 6 inches (152 mm) longer than hinge, secured by not less than 6 spot welds.
 3. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch (1.7 mm) thick.
 4. All Other Surface-Mounted Hardware: Minimum 0.067 inch (1.7 mm) thick.
- F. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.
- G. Jamb Anchors:
 1. Metal Stud Anchor: Z-type anchor, welded to frame, 0.053-inch thick steel, UL listed as required for fire rating.

- H. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:
 1. Used at all frames installed prior to walls. Where frames are installed after walls, install an additional jamb anchor within the lowest 6-inches of the door jamb, one each side.
 2. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 3. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (50-mm) height adjustment. Terminate bottom of frames at finish floor surface.
- I. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.
- J. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from cold-rolled or hot-rolled steel (at fabricator's option).
 1. Transom Bar Frames: Provide closed tubular members with no visible face seams or joints. Fasten members at crossings and to jambs by butt welding according to joint designs in HMMA 820.
 - a. Provide false head member to receive lower ceiling where frames extend to finish ceilings of different heights.
- K. Fabricate frames having multiple openings with mullion members having no visible seams or joints. Continuously weld face, rabbet, and soffit joints between abutted members and finish smooth when exposed to view.

2.4 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A653/A653M, with ASTM A924/A924M, G60 zinc coating, mill phosphatized.
- C. Door Louvers: SDI 111C, sight proof, inverted V or Y blades, with insect screen at exterior doors, size as indicated on Drawings.
- D. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A153/A153M, Class B.
- E. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A153/A153M.
- F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching standard steel door frames of type indicated.
- G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

H. Glazing: Comply with requirements in Section 08 81 00.

2.5 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with standard steel frames, minimum 5/8 inch (16 mm) high, unless otherwise indicated.
- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as frames in which they are installed.

2.6 FABRICATION

- A. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant.
- B. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at project site.
- C. Hollow Metal Doors:
 - 1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 - 2. Glazed Lites: Factory cut openings in doors.
 - 3. Fabricate exposed faces of doors and panels, including stiles and rails of non-flush units, from only cold-rolled steel. Install insulation in doors where scheduled on Drawings.
 - 4. Fabricate exterior doors, panels, and frames from galvanized sheet steel. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16-gage inverted steel channels. Seal joints watertight.
- D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 2. Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - 3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - 5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - 6. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from cold-rolled or hot- rolled steel (at fabricator's option).
 - 7. Provide 3/8-inch back bend return on frames where gypsum board wall material occurs whether on one or both sides.

8. Fabricate frames having multiple openings with mullion members having no visible seams or joints. Continuously weld face, rabbet, and soffit joints between abutted members and finish smooth when exposed to exterior.
- E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 4. Provide loose stops and moldings on inside of hollow metal work.
 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
 6. Factory-install glass in prepared openings.
- F. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts. Paint heads to match adjacent surfaces.
- G. Finish Hardware Preparation: Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.
1. Locate finish hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware", published by Door and Hardware Institute.
 2. Prepare frames for silencers except for frames which receive weatherstripping.
 3. Provide dust cover boxes or mortar guards of 0.016-inch thick steel at all hardware mortises on frames.
 4. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
- H. Attach fire rated label to each rated frame and door unit.
- I. Factory-install louvers in prepared openings.

2.7 STEEL FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
1. Finish standard steel door and frames after assembly.
- B. Metallic-Coated Steel Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A780/A780M.
1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

- C. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- D. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
- E. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils (0.018 mm).
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

2.8 ACCESSORIES

- A. Supports and Anchors: Fabricated from not less than 0.042-inch- (1.0-mm-) thick, electrolytic zinc-coated or metallic-coated steel sheet.
 - 1. Wall Anchors in Masonry Construction: 0.177-inch- (4.5-mm-) diameter, steel wire complying with ASTM A510/A510M may be used in place of steel sheet.
- B. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A153/A153M, Class C or D as applicable.
- C. Shop Applied Primer: Rust-inhibitive enamel or paint, air-drying or baking type, suitable as a base for specified finish paints.
- D. Plaster Guards: Provide 0.016-inch- (0.4-mm-) thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.
- E. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.
- F. Finish: Paint in accordance with Section 09 91 00.

PART 3 - EXECUTION

- A. Placing Frames: Comply with provisions of ANSI A250.11 "Recommended Erection Instructions for Steel Frames", unless otherwise indicated.
- B. Standard Steel Frames: Install standard steel frames for doors, sidelights, borrowed lights and other openings, of size and profile indicated. Comply with ANSI A250.11.

C. Standard Steel Doors:

1. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

END OF SECTION 08 11 13

SECTION 08 11 16 – INTERIOR ALUMINUM DOOR AND WINDOW FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Standard commercial interior aluminum storefront system, including perimeter trims, stools, shims and anchors, and perimeter sealing of storefront units.

1.3 RELATED SECTIONS

- A. Section 08 11 13 – Hollow Metal Doors and Frames: Steel doors and door frames.
- B. Section 08 14 16 - Flush Wood Doors.
- C. Section 08 71 00 - Door Hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- 1. Basis-of-Design: Kawneer Trifab 451, 2" x 4-1.2", to match exterior storefront
 - a. Glazing Plane: Front Glazed

2.2 PERFORMANCE REQUIREMENTS

- A. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- B. VOC Content: Adhesives and sealants applied on-site on the interior of the building and products used on the interior of the building shall comply with VOC limits as specified in Section 01 8113 - Sustainable Design Requirements.
 - 1. Use materials that have the minimum VOC content in units of g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Sheet and Plate: ASTM B209.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
 - 3. Extruded Structural Pipe and Tubes: ASTM B429/B429M.
 - 4. Structural Profiles: ASTM B308/B308M.

- B. Carbon Steel Reinforcement: ASTM A36/A36M for structural shapes, plates and bars; ASTM A1008/A1008M for cold rolled sheet and strip, or ASTM A570 for hot rolled sheet and strip.
- C. Anchors, Clips, and Accessories: ASTM A123/A123M, aluminum, non-magnetic stainless steel or hot-dip, zinc-coated steel.
- D. Exposed Fasteners: Use exposed fasteners (Phillips flat-head screws) only to apply hardware. Match the finish of the member or hardware being fastened.

2.4 INTERIOR ALUMINUM-FRAMED STOREFRONT SYSTEM

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads. Color to match project typical exterior, interior storefront and curtainwall systems mullion.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
- D. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

2.5 INTERIOR ALUMINUM STOREFRONT DOORS

- A. Stile-and-Rail Type Interior Doors: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts. Color to match project typical exterior, interior storefront and curtainwall systems mullion frame members.
- B. Design: Provide 1-3/4-inch-thick doors of design as follows.
 1. Stile Design: Medium stile; 3-1/2-inch (88.9-mm) nominal width.
- C. Glazing Frames: For glazing thickness indicated.
- D. Trim: Extruded aluminum, not less than 0.062 inch (1.6 mm) thick, with removable snap-in glazing stops without exposed fasteners.
- E. Glazing Gaskets: Manufacturer's standard extruded or molded plastic, to accommodate glazing thickness indicated.
- F. Hardware:
 1. Color of exposed door hardware to match door, typical.
 2. Pivot Hinges: BHMA A156.4, Grade 1.
 3. Locking Devices, General: Do not require use of key, tool, or special knowledge for operation.
 4. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
 5. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.

6. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
 - a. Standard: BHMA A156.3, Grade 1.
7. Cylinders: As specified in Section 08710; BHMA A156.5, Grade 1.
8. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
9. Operating Trim: BHMA A156.6.
10. Removable Mullions:
 - a. Standard: BHMA A156.3.
 - b. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.
11. Closers: With accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use, and adjustable to meet field conditions and requirements for opening force.
 - a. Standard: BHMA A156.4, Grade 1.
12. Concealed Overhead Holders: BHMA A156.8, Grade 1.
13. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
14. Door Seals: Manufacturer's standard replaceable components.
 - a. Compression Type for Rated Conditions: Made of ASTM D2000, molded neoprene, or ASTM D2287, molded PVC.
 - b. Sliding Type for Non-rated Conditions: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

2.6 FABRICATION

- A. Fabricate frame units to be rigid, neat in appearance and free from defects, warp or buckle, to shapes as required for each application, for knock down field assembly.
- B. Clearly identify work before shipment to assure proper assembly at project site.
- C. Provide metal frames for doors and other openings, of types and styles as shown on Drawings and schedules. Conceal fastenings, unless otherwise indicated.
 1. Provide wool pile or gasketing in door frames to prevent metal-to-metal contact.
- D. Fasteners and Hardware: Aluminum, stainless steel, or other non-corrosive materials compatible with aluminum and acceptable to frame manufacturer, countersunk style. Exposed fasteners not permitted.
- E. Finish Hardware Preparation: Prepare frames to receive finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.
- F. Fabricate frame members mortised, drilled and tapped for hinge and strike locations.

- G. Locate finish hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware", published by Door and Hardware Institute.
- H. Reinforcing: Install reinforcing as required for hardware and as necessary for sag resistance and rigidity.
- I. Door Seals: Provide continuous, nylon backed wool pile sound and light seal around perimeter of doorstop.

2.7 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect and Owner from manufacturer' full color palette.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 08 11 16

SECTION 08 13 76 – FOLDING METAL DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Aluminum-framed panel folding doors shown on drawings.

1.3 RELATED SECTIONS

- A. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts: Exterior aluminum entrance doors.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide complete, precision built, engineered, pre-fitted unit by a single source manufacturer with at least 15 years' experience in providing folding/sliding door systems for large openings.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.
- C. Preinstallation Conference: Conduct conference at Project site.

1.5 WARRANTY

- A. Provide manufacturer's written warranty in which manufacturer agrees to repair or replace doors and accessories that fail in materials, fabrication, or installation within specified warranty period. Manufacturer may not disclaim any implied warranty such as merchantability or fitness for a particular purpose. Both the expressed and implied terms of the warranty may be read together for the benefit of the City.
- B. Warranty Period:
 - 1. Rollers: Ten years.
 - 2. Seal Failure of Insulated Glass: Ten years.
 - 3. For All Other Components: One year from date of delivery by manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Performance Criteria: Provide from manufacturer that has independently tested typical units with the following minimum results.
1. Air infiltration: Provide system with maximum air leakage of 0.30 cfm/sq ft when tested according to ASTM E283 and NFRC 400 at a static air pressure difference of 1.57 psf and 6.24 psf.
 2. Water Penetration under Static Pressure:
 - a. Provide system with an ADA compliant saddle sill with typical field installed weep holes and drainage that do not evidence water penetration when tested according to ASTM E331 and ASTM E 547 at a static air pressure difference of 5.25 psf for an inswing unit and 6.00 psf for an outswing unit.
 3. Structural Test Performance:
 - a. Provide system with optional reinforced posts that when tested according to ASTM E 330 at 150 % of positive and negative design pressures with panel sizes of 3' wide and 8' high achieved with an inswing unit with a raised sill DP rating of +70 psf / -100 psf and an outswing unit with a raised sill and inswing/outswing units with saddle sills DP ratings of +/- 70 psf.
 - b. Provide standard system that when tested according to ASTM E 330 at 150 % of positive and negative design pressures with panel sizes of 2'11" wide and 8'1" high achieved with an inswing unit with a raised sill DP rating of +55 psf / -90 psf, an outswing unit with a raised sill DP rating of -90 psf /+55 psf and inswing/outswing units with saddle sills DP ratings of +/- 50 psf.
 4. Forced Entry Resistance: Provide system that when tested according to ASTM F 842 and AAMA 1304 there was no entry.
- B. Thermal Performance U factor: Unit to be rated, certified and labeled in accordance with NFRC 100, shown in manufacturer's latest published data for the glazing, sill, and direction of opening specified.
- C. Provide folding glass storefront units tested to AAMA/WDMA/CSA 101/I.S.2/A440.
- D. Solar Heat Gain Coefficient: Unit to comply with the solar heat gain coefficient, simulated in accordance with NFRC 200, shown in manufacturer's latest published data for the glazing specified.
- E. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- F. VOC Content: Field-applied touch up primers, paints, clear coatings, and galvanizing agents applied on the interior of the building and products used on the interior of the building shall comply with VOC limits as specified in Section 01 8113 - Sustainable Design Requirements.
1. Use materials that have the minimum VOC content in units of g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.2 MANUFACTURERS

- A. Basis-of-Design: La Cantina, Aluminum Thermally Controlled Folding Doors
- B. Head Jamb, Tracks, Stacking Bays, and Sill: From manufacturer's standard profiles, thermally broken, provide head tracks, stacking bays, and sill with dimensions shown on drawings.
- C. Clear anodized standard flush sill.
- D. Frame and Panels: From manufacturer's standard profiles, provide head jamb, side jambs, and panels with dimensions shown on drawings and as needed for panel stability.
 - 1. Aluminum Extrusion: Extrusions with nominal thickness of 059" (1.5 mm). Alloy specified as AlMgSi0.5 with strength rated as 6063-T5; anodized conforming to AAMA 611.
 - 2. Panels:
 - a. Thickness 2-1/4 inches (57 mm).
 - b. Stile and Rail 2-15/16 inches (75 mm).
 - c. Bottom Rail 10-inches.
 - 3. Provide panels with standard one lite.
 - 4. Aluminum head track to match storefront where exposed.
 - 5. Configuration: As indicated on Drawings, panels aligned with transom vertical mullions above, where occurs.
 - 6. Provide ADA compliant, operable mandoor(s) as indicated on Drawings.
 - 7. Cladding: Aluminum inside and outside.
 - 8. Color: Match exterior storefront and curtain wall mullions.

2.3 GLAZING

- A. Provide manufacturer's standard glass and dry glazing with EPDM gaskets and glass stops fixed with hidden fasteners, 15/16-inch (24 mm) insulating clear tempered.
 - 1. Glazing: Silicone bedding on exterior surfaces and glazing seal on the interior of each panel.
- B. Safety Glass: Comply with safety glazing requirements of ANSI Z97.1 and CPSC 16CFR 1201.

2.4 HARDWARE

- A. Main Entry Panel Handles: Manufacturer's standard handles on the inside and outside, and a lock set with profile cylinder with three point locking hardware.
 - 1. On all other secondary panels, provide manufacturer's removable custodial handles.
 - 2. Provide with panic hardware and exit sign.
 - 3. Finish: Match door hardware for the room.
- B. Core Material and Thickness: Manufacturer's standard.

- C. Sliding/Folding Hardware: Provide manufacturer's standard combination sliding and folding hardware with top, bottom tracks and threshold. All running carriages to be with sealed, self-lubrication, ball bearing multi-rollers. Surface mounted hinges and running carriages will not be allowed. Weight of panels to be borne by the bottom of the track will not be allowed.
 - 1. Thresholds/Sill Track: ADA compliant
- D. Tracks: Manufacturer's standard recessed, extruded-aluminum or steel track with factory-applied, corrosion-resistant finish. Limit track deflection, independent of structural supporting system, to no more than 80 percent of bottom clearance. Design and fabricate track to support operation without damage to track, folding unit, or adjacent surfaces; complying with the following requirements:
 - 1. Prefinished ceiling guard/channel for recessed tracks.
- E. Jamb Molding: Manufacturer's standard metal molding at closing jamb as required for light-tight jamb closure.
 - 1. Metal: Manufacturer's standard finish.
- F. Adjustment: Provide system capable of being adjusted without removing panels from tracks
- G. Stacking: Tiebacks to maintain door in stacked position.

2.5 FABRICATION

- A. Use extruded aluminum frame and panel profiles with male-female interlocking, corner connectors and hinges, sliding and folding hardware, locking hardware and handles, glass and glazing and weather stripping as specified herein to make a folding glass wall. Factory pre-assemble as is standard for manufacturer and ship with all components and installation instructions.
- B. Sizes and Configurations: See Drawings for selected custom dimensions within maximum frame sizes possible as indicated in manufacturer's literature. See Drawings for selected number of panels, configuration, and direction of operation.

2.6 FINISHES

- A. General: Comply with NAAMM "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to application and designations of finishes.
- B. Extruded Aluminum Surfaces:
 - 1. High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2604 and with coating and resin manufacturers' written instructions.
 - 2. Color: Match interior and exterior storefront mullions.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 08 1376

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SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Solid core wood doors where shown in door schedule

1.3 RELATED SECTIONS

- A. Section 08 71 00 – Door Hardware: Installation of hardware in wood doors.
- B. Section 08 81 00 – Glass Glazing: Glass for glazed stile and rail doors.
- C. Section 09 91 00 – Painting

1.4 QUALITY STANDARDS

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Comply with NAAWS "Architectural Woodwork Standards" for requirements in the door grades indicated.
- C. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials, fabrication or installation within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.
 - 2. Warranty Period for Solid-Core Interior Doors: Life of the original installation, including costs of re-hanging.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General Wood Door Product Requirements: Provide doors with same exposed surface material on both faces of each door; meeting requirements of NAAWS Section 9; unless otherwise indicated.
- B. Certified Wood: Use wood based products made from wood obtained from forests certified by an FSC accredited certification body to comply with the Forest Stewardship Councils “Principles and Criteria.”
- C. Adhesives: Water-resistant type recommended by material manufacturer for products and substrate conditions indicated.
 - 1. Use materials that have the lowest possible VOC content in units of g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Composite Wood and Agrifiber: Use only composite wood and agrifiber products free of added urea formaldehyde resin binders.
- E. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
- F. Adhesives: NWWDA IS-1.6, Type II adhesive bond or better for cores, Type I adhesive bond for faces and cross bands. Do not use adhesives containing urea formaldehyde.

2.2 INTERIOR DOOR CONSTRUCTION

- A. General Wood Door Product Requirements: Provide doors with same exposed surface material on both faces of each door; meeting requirements of NAAWS Section 9 unless otherwise indicated.
- B. Interior, Solid-Core, Veneer-Faced Doors for Transparent Finish:
 - 1. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering, FSC-certified wood faces.
 - 2. Adhesive: Type I or Type II
 - 3. Grade: Premium (Grade A faces).
 - 4. Species and Cut: White Maple, plain sliced. Match Architect’s sample approved by Owner
 - 5. Finish: Clear finish.
 - 6. Match between Veneer Leaves: Book match.
 - 7. Assembly of Veneer Leaves on Door Faces: Running match.
 - 8. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
 - 9. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
 - 10. Corridor Match: Corridor door faces do not need to match where they are separated by 20 feet (6 m) or more.
 - 11. Stiles: Same species as faces.
 - 12. WDMA I.S.1-A Performance Grade:
 - a. Heavy Duty: At office, mechanical service, hallway, storage doors.

- b. Extra Heavy Duty: At public bathrooms, assembly areas, and breakrooms.
 - 13. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
 - b. 5-inch (125-mm) bottom-rail blocking, typical, except where specified otherwise for special conditions.
 - c. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
 - d. 10-inch (250-mm) bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - 14. Provide doors with glued-wood-stave cores instead of particleboard cores for doors indicated to receive exit devices.
- C. Particleboard Cores (Non-Rated Doors):
- 1. Core (Solid, Non-Rated): NAAWS Section 9, HPVA Grade A, particleboard core.
 - 2. Particleboard: ANSI A208.1, Grade LD-1.
 - a. Use particleboard made with binder containing no urea-formaldehyde resin.
 - 3. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
 - b. 5-inch (125-mm) bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - c. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
 - 4. Provide doors with glued-block cores instead of particleboard cores at locations where exit devices are indicated.
 - 5. Grade: Premium.
 - 6. Finish: Match typical interior wood doors, veneer, stained.
 - 7. Faces: Match typical interior wood doors.
 - 8. Core: SingCore, no known equal.
 - 9. Construction: Five plies, bonded.
- 2.3 GLAZING
- A. Glass: Tempered 1/4-inch glass. See Section 08 81 00.
 - B. Glazing Stops:
 - 1. Non-rated Areas: Wood, of same species as door facing.
- 2.4 LOUVERS
- A. Metal Louvers:
 - 1. Blade Type: Vision-proof, inverted V.
 - 2. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, factory primed for paint finish.
 - 3. Location: Limit installation of metal louvers at doors indicated to be acceptable by Owner.
 - 4. Size: Per free area requirements as confirmed acceptable by Owner.
 - 5. Color: Match Architect's sample approved by Owner.
- 2.5 FABRICATION
- A. Factory-pre-fit and pre-machine doors to fit frame opening sizes indicated and complying with NAAWS pre-fitting tolerances.

- B. Provide lock blocks at lock edge and top of door for closer as required for hardware reinforcement.
- C. Vertical Exposed Edge of Stiles: Hardwood of species compatible in color with veneer facing for transparent finish; hardwood for paint finish.
- D. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware. Provide solid blocking for through bolted hardware.

2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Finish doors at factory.
- C. Transparent Finish:
 - 1. Grade: Custom.
 - 2. NAAWS Finish System 2: Score 99-T, lacquer pre-catalyzed.
 - 3. Staining: Match approved sample for color.
 - 4. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D523.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood doors to comply with manufacturer's instructions, in accordance with NAAWS Section 9 requirements.
- B. Align and fit doors in frames with uniform clearances and bevels. Machine doors for hardware. Seal cut surfaces after fitting and machining.
- C. Do not impair utility or structural strength of doors in fitting to the opening, in applying hardware, preparing lights, louvers, or plant-ons or other detailing.
- D. Install pre-fit and pre-machined doors in accordance with manufacturer's data. Install with a maximum clearance of 1/8 inch on the lock side, 1/8 inch between meeting edges of paired doors and 1/8 inch between top of door and frame header.
- E. If not pre-machined, use a minimum of 1 hinge for each 30 inches of door height. Equally space hinges when using 3 or more.
- F. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - 1. Fitting Clearances:

- a. Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors.
 - b. Provide 1/4 – 3/8-inch (6 – 9.5 mm) from bottom of door to top of decorative floor finish or covering.
 - c. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold.
- G. Doors may not extend beyond 1/16 inch from the face of the jamb nor more than 1/8 inch behind jamb face.
- H. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- I. Cutouts, Recesses, and Exposed Rail Edges: Unless factory provided, paint with two coats of clear sealer, each coat well dried, before hardware is set in place.
- J. Meeting stiles of pairs of doors shall be in alignment along the entire height, and offset between adjacent leaves shall not exceed 1/8-inch

END OF SECTION 08 14 16

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SECTION 08 31 13 – ACCESS DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Access panels and doors in walls and gypsum ceilings.

1.3 RELATED SECTIONS

- A. Section 09 91 00 – Painting: Finish painting for metal surfaces.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- B. Provide fire-rated access doors that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per test method indicated, and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities have jurisdiction.
 - 1. Fire-Rated Vertical Access Door Assemblies: NFPA 252 or UL 10B.
 - 2. Fire-Rated Horizontal Access Door Assemblies: NFPA 288.

PART 2 - PRODUCTS

2.1 ACCESS DOORS

- A. Furnish access doors of proper size for access to concealed equipment. Unless otherwise indicated, minimum size shall be 12-inch x 12-inch for hand access and minimum 18-inch x 18-inch for valve and actuator access and 24-inch x 24-inch for equipment access. Quantities and locations to be reviewed by Architect and approved by Owner.
- B. Flush, Insulated, Fire-Rated Access Doors and Frames with Exposed Flanges: Fabricated from steel sheet.
 - 1. Locations: Wall and ceiling surfaces or fire-rated and sound-rated construction.
 - 2. Fire-Resistance Rating: One hour for ceilings and one and one-half hours for walls.
 - 3. Temperature Rise Rating: 250 deg F (139 deg C) at the end of 30 minutes.
 - 4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch (0.9 mm).
 - 5. Frame: Minimum 0.060-inch- (1.5-mm-) thick sheet metal with 1-inch (25-mm) wide, surface-mounted trim.
 - 6. Finish: Phosphate dipped with baked-on rust inhibiting primer for field painting as specified in Section 09 9100. Painted to match adjacent wall or ceiling surface.

7. Insulation: 2-inch thick fire-rated insulation sandwiched between two pieces of 20-gauge steel.
 8. Hinges: Continuous piano hinge.
 9. Automatic Closer: Spring type.
 10. Hardware: Self-latching bolt with automatic closer and interior latch release.
 11. Latch/Lock: Ball bearing cylinder lock operated by a recessed flush key lock. Panels shall have interior latch release mechanism allowing the door to be unlocked from the inside. Provide keyed locks at access doors located in public areas.
 12. At sound-rated construction, seal door flanges with Pemko S88 smoke seals at perimeter, color that most closely matches adjacent finished surfaces. Seal entire assembly to gypsum board with acoustical sealant specified in Section 07 9200.
- C. Flush, Non-Rated Access Doors and Frames with Exposed Flanges: Fabricated from steel sheet.
1. Locations: Wall and ceiling surfaces in Toilet Rooms, Custodial Rooms, and other Wet Areas.
 2. Door: Minimum 0.060-inch- (1.5-mm-) thick sheet metal, set flush with exposed face flange of frame.
 3. Frame: Minimum 0.060-inch- (1.5-mm-) thick sheet metal with 1-inch (25-mm wide, surface-mounted trim.
 4. Hinges: Continuous piano hinge.
 5. Hardware: Screwdriver-operated cam latch.
 6. Finish: Painted to match adjacent wall or ceiling surface.
- D. Flush, Non-Rated Access Doors and Frames with Exposed Flanges: Fabricated from steel sheet.
1. Locations: Wall tile surfaces in Toilet Rooms.
 2. Door: Minimum 0.060-inch- (1.5-mm-) thick sheet metal, set flush with exposed face flange of frame.
 3. Frame: Minimum 0.060-inch- (1.5-mm-) thick sheet metal with 1-inch (25-mm wide, surface-mounted trim.
 4. Hinges: Continuous piano hinge.
 5. Finish: Stainless Steel
- E. Hardware: Screwdriver-operated cam latch
- F. Flush recessed, Non-Rated Access Doors with concealed hardware and gypsum board inlay for flush installation In Occupied, Public Spaces
1. Product: Basis-of-design: Bauco Plus II
 2. Locations: Drywall, plasterboard, wallboard, gypsum board, sheetrock or gypboard; wall or ceiling installation in occupied, public spaces
 3. Access Door: Rounded edges
 4. Shell Thickness: 1/8" to 3/16".
 5. Fastener Test Pull Out (Metal Stud): 215 lb avg.
 6. Fastener Push-Through Test: 350 lb avg.
 7. Fuel Contribution: ASTM E84; 0.
 8. Flame Spread: ASTM E84; 0.
 9. Smoke Index: ASTM E84; 0.
 10. Combustion: ASTM E84; Non-combustible.
 11. Class A Non-Rated.
 12. Moisture mold resistant GWB inlay

13. Concealed mechanical touch-latch
14. Strong concealed aluminum frame and hardware
15. Perimeter gasket (air & smoke tight)

2.2 MATERIALS

- A. Sheet Steel: ASTM A36/A36M, commercial-quality, cold-rolled steel with baked-on, rust inhibitive primer.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Cold-Rolled Steel Sheets: ASTM A36/A36M, Commercial Steel (CS), or ASTM A620/A620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified nominal thickness according to ASTM A568/A568M. Electrolytic zinc-coated steel sheet, complying with ASTM A591/A591M, Class C coating, may be substituted at fabricator's option.
- D. Electrolytic Zinc-Coated Steel Sheet: ASTM A591/A591M, Commercial Steel (CS), with Class C coating and phosphate treatment to prepare surface for painting; with minimum thickness indicated representing specified nominal thickness according to ASTM A568/A568M for uncoated base metal.
- E. Aluminum alloy 6063-T6

2.3 FABRICATION

- A. General: Provide access door assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Steel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
 1. Exposed Flanges: Nominal 1 inch (25 mm) wide around perimeter of frame.
 2. Provide mounting holes in frames to attach frames to metal or wood framing in plaster and drywall construction and to attach masonry anchors in masonry construction.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 1. For keyed latches, furnish two keys per latch and key all latches alike.

2.4 STEEL FINISHES

- A. Surface Preparation: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

B. Steel and Metallic-Coated-Steel Finishes:

1. Apply shop primer to uncoated surfaces of metal fabrications.
2. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 08 31 13

SECTION 08 41 13 – ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Aluminum-Framed Windows, Entrances and Storefronts:
- B. Exterior manual-swing entrance doors.
 - 1. Glazed Entrances:
 - a. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.40 as determined according to NFRC 200.
 - b. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 45 as determined according to NFRC 500.
- C. Operable windows installed in storefront system.

1.3 RELATED SECTIONS

- A. Section 07 92 00 – Joint Sealants: Perimeter sealants around installed storefront system.
- B. Section 08 71 00 – Door Hardware: Installation of lock cylinders.
- C. Section 08 81 00 – Glass Glazing.
- D. Section 10 71 13 – Exterior Sun Control Devices: Horizontal and vertical sunshades.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Provide aluminum entrances and storefront systems produced by a firm experienced in manufacturing systems that are similar to those indicated for this project and that have a record of successful in-service performance.
- B. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.
- C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of aluminum entrances and storefront systems that are similar to those indicated for this Project in material, design, and extent.

- D. Engineering Responsibility: Prepare data for entrance and storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- E. Single Source Responsibility: Obtain aluminum entrance and storefront systems from one source and from a single manufacturer.
- F. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not revise intended aesthetic effects, as judged solely by Architect, without Architect's approval. If revisions are proposed, submit comprehensive explanatory data comparing proposed substitution to named system, with substitution request to Architect for review.
- G. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Field testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Approved mockups may become part of the completed Work if undisturbed at time of Project Acceptance.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Adhesive or cohesive sealant failures.
 - e. Water leakage through fixed glazing and framing areas.
 - f. Failure of operating components.
 - 2. Warranty Period: Five years from date of Project Acceptance.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: 20 years from date of Project Acceptance.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed systems representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Aluminum-framed systems shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
- B. Delegated Design: Design entrance and storefront systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Primary Building Structure: Designed for vertical and lateral loads only, and not to resist torsional stresses induced by entrance and storefront systems.
 - 1. Strength: Design system to withstand loads as required by California Building Code.
- D. Provide glazed storefront systems, including anchorage, capable of withstanding, without failure, the effects of the following:
 - 1. Structural loads.
 - 2. Thermal movements.
 - 3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 4. Dimensional tolerances of building frame and other adjacent construction.
 - 5. Failure also includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferred to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
 - d. Noise or vibration created by wind and thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
- E. Deflection of Framing Members: At design wind pressure, as follows:
 - 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.
 - 3. Cantilever Deflection: Where framing members overhang an anchor point, limited to:
 - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.

- F. Structural-Test Performance: Provide entrance and storefront systems in accordance with ASTM E330 and as follows:
1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Duration: As required by design wind velocity but not less than 60 seconds.
- G. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.30 cfm/sq. ft. (1.50 L/s per sq. m) of fixed wall area as determined according to ASTM E283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft. (300 Pa).
1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.06 cfm/sq. ft. (0.30 L/s per sq. m at a static-air-pressure differential of 6.24 lbf/sq. ft. (300 Pa)
 2. Entrance Doors:
 - a. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. (2.54 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
- H. Water Penetration Under Static Pressure: Provide entrance and storefront systems that do not evidence water penetration when tested according to ASTM E331 at a minimum differential static pressure of 20 percent of positive design wind load, but not less than not less than 10 lf/sq ft.
- I. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft.
 2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- J. Seismic Performance: Entrance doors shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7:
1. Component Importance Factor: As indicated on Structural Documents
 2. Seismic Category: As indicated on Structural Documents
 3. Risk Category: As indicated on Structural Documents
 4. Seismic Drift: Conform with applicable codes. Size, fabricate, assemble and erect work to accommodate interstory drift (horizontal displacement) during a major seismic event. Interstory drift values for this building are calculated as follows:
 - a. Elastic Drifts between Type I levels=0.15"
 - b. Inelastic Drifts between Type I levels=0.75"
 - c. Elastic Drifts between Type IV levels=0.35"
 - d. Inelastic Drifts between Type IV levels=1.75"
 5. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement and 1.5 times the design displacement.
 6. Building Deflections: Size primary members to accommodate building deflections. Fabricate, assemble and erect work to accommodate following limitations:

- a. Post-tensioned concrete slabs: Allow for vertical deflection. Calculated vertical deflection is 3/8-inches up or down beginning immediately following slab construction.
- K. Water and Air Leakage: Installed system shall be free of leakage of both water and air.
 1. Water leakage is defined as uncontrolled penetration of water (not including condensation) to interior of building.
 2. Air leakage is defined as infiltration of air at any area of window wall, at a rate in excess of 0.06 cfm/sf of area, based on measurement of single complete module of system.
- L. Condensation: Provide minimum tested Condensation Resistance Factor (CRF) of 45.
- M. Energy Performance: Certify and label energy performance according to NFRC as follows:
 1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.57 Btu/sq. ft. x h x deg F (3.23 W/sq. m x K) as determined according to NFRC 100.
 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 as determined according to NFRC 200.
 3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 45 as determined according to NFRC 500.
- N. Thermal Movements: Provide entrance and storefront systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F (82 deg C).
 - b. Low Exterior Ambient-Air Temperature: 0 deg F (minus 18 deg C).

2.2 FRAMING SYSTEMS

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 1. Construction: Thermally Broken, AAMA TIR-A8 and tested in accordance with AAMA 505
 2. Finish: High-performance organic finish, match curtainwall system.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposes shall be stainless steel.

- D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action
- E. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- F. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation. Exterior System: :
 - 1. Basis-of-design: Kawneer TriFab 451T, 2" x 4-1/2".
 - 2. Construction: Thermally-broken.
 - 3. Glazing System: Retained mechanically with gaskets on four sides.
 - 4. Glazing Plane: Front glazed.
 - 5. Framing: Shear-block system.
 - 6. Corner: Butt glazed
 - 7. Finish: Match curtainwall and interior storefront systems.

2.3 FINISH: MATCH CURTAIN WALL SYSTEM. ENTRANCE DOOR SYSTEMS

- A. Stile-and-Rail Type Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
 - 1. Metal Thickness: 3/16-inch
 - 2. Stile Design: Medium stile; 5-1/2 by 1-3/4-inches. Narrow stiles not acceptable.
 - 3. Head Rail: 6-1/2 by 1-3/4-inches.
 - 4. Bottom Rails: 10 -inches.
 - 5. Hardware Reinforcement: 1/4-inch thick metal material
 - 6. Finish: Match storefront color.
 - 7. Door hardware shall match make, style and color as specified, submitted and approved for all doors in project scope. Exposed door hardware color to match door color. Provide from Aluminum Door supplier a hardware submittal for review by City Representative.
 - a. Hinges shall be pivot or continuous geared type; manufactures: Select Products, Roton, or approved equal.
 - b. Concealed head or floor type closers are not acceptable.
 - 8. All doors and frames shall accommodate insulated glazing.
 - 9. Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods or j-bolts.
 - 10. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
 - 11. Equip each door leaf with an adjusting mechanism located in the top rail near the lock stile, which provides for minor clearance adjustments after installation.
- B. Miscellaneous Brake Shapes: Provide headers, closures, anchors and supports as indicated and required. Fabricate from minimum 0.090-inch aluminum unless otherwise indicated.
- C. Entrance Door Hardware: As specified in Section 08 71 00.

- D. Brackets and Reinforcements: Provide high-strength aluminum brackets and reinforcements; where use of aluminum is not feasible provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A123.
 - 1. Where fasteners screw-anchor into aluminum members less than 0.125 inches thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.
- E. Fasteners: Provide corrosion-resistant, nonstaining, nonbleeding fasteners of aluminum, nonmagnetic stainless steel, zinc plated steel, or other material warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components and adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Where exposed fasteners are unavoidable, use countersunk Phillips screw heads, finished to match framing system.
 - 4. Exposed fasteners must have bonded neoprene washers or be sealed.
- F. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A123/A123M or ASTM A153/A153M.
- G. Concealed Flashing: 0.0179-inch (26 gage) minimum dead-soft stainless steel, or 0.026-inch-thick minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components and adjacent materials.
- H. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.
 - 1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 GLAZING SYSTEMS

- A. Glazing: As specified in Section 08 81 00 Glass Glazing.
- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type in hardness recommended by system and gasket manufacturer to comply with system performance requirements.
 - 1. Color: Black.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:

1. Weatherseal Sealant: ASTM C920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
 - a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Glass to Mullion Sealant Color: Black.
 - c. Butt-joint Glass Sealant Color: Clear.

- F. Secondary Sealants and Joint Fillers: For use as weatherseal at perimeter of entrance and storefront systems, compatible with structural sealant and other system components with which it comes in contact, as listed in Section 07 9200.
 1. Color: As selected by Architect and Owner from manufacturer's full range of colors.

- G. Miscellaneous Brake Shapes: Provide headers, closures, anchors and supports as indicated and required. Fabricate from minimum 0.090-inch aluminum unless otherwise indicated.

2.5 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 1. Sheet and Plate: ASTM B209/B209M.
 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221/B221M.
 3. Extruded Structural Pipe and Tubes: ASTM B429.
 4. Structural Profiles: ASTM B308/B308M.
 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

- B. Aluminum for Break Shapes: ASTM B209 (ASTM B209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H32.

- C. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 1. Structural Shapes, Plates and Bars: ASTM A36.
 2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
 3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

2.6 ACCESSORY MATERIALS

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 07 92 00.
 1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.7 FABRICATION

- A. Fabricate aluminum entrance and storefront components to designs, sizes and thicknesses indicated and to comply with indicated standards.
 - 1. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
 - 2. Provide sub-frames and reinforcing of types indicated or, if not indicated, as required for a complete system.
 - 3. Sizes and profile requirements are indicated on the Drawings. Variable dimensions are indicated, with maximum and minimum dimensions required, to achieve design requirements and coordination with other work.
- B. Welding: Comply with AWS recommendations.
 - 1. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finished surfaces.
 - 2. Grind exposed welds smooth to remove weld spatter and welding oxides from exposed surfaces by descaling or grinding. Restore mechanical finish.
- C. Prefabrication: Complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible before shipment to the Project site. Disassemble components only as necessary for shipment and installation.
- D. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing from interior.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 - 8. Continuity: Maintain accurate relation of planes and angles with hairline fit of contacting members.
- E. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- F. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- G. Storefront Framing: Fabricate components for assembly using shear-block system. Stick framing is not permitted.

- H. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 - 1. Install reinforcing as required for hardware and as necessary for performance requirements, sag resistance and rigidity.
 - 2. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. Complete these operations for hardware prior to application of finishes.
 - 3. At exterior doors, provide compression weather stripping at fixed stops.
 - 4. Provide for wiring within framing system to accommodate power-operated hardware. Include cutouts, raceways, conduits, and other such provisions to permit a complete operating hardware system.

- I. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 - 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 - 2. For exterior doors, provide compression weather stripping against fixed stops.
 - 3. At exterior doors, provide weather sweeps applied to door bottoms.
 - 4. Pre-glaze door units to greatest extent possible.

- J. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
 - 1. Do not drill and tap for surface-mounted hardware items until time of installation at Project Site.

- K. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

- L. Dissimilar Metals: Separate dissimilar metals with bituminous paint, or a suitable sealant, or a non-absorptive plastic or elastomeric tape, or a gasket between the surfaces. Do not use coatings containing lead.

2.8 FINISHES

- A. General: Comply with NAAMM "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to application and designations of finishes.

- B. Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Color and Gloss: TBD.

2.9 STEEL REINFORCEMENT PRIMING

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.

- B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.

- C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections.
- B. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows and in successive phases as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
 - 1. Water Penetration: Areas shall be tested according to ASTM E1105 at a minimum uniform and cyclic static-air-pressure difference of 0.67 times the static-air-pressure difference specified for laboratory testing under "Performance Requirements" Article, but not less than 4.18 lbf/sq. ft. (200 Pa), and shall not evidence water penetration.
 - 2. Water Spray Test: Before installation of interior finishes has begun, a minimum area of 75 feet (23 m) by 1 story of aluminum-framed systems designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
- C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports.

3.2 DEMONSTRATION

- A. Water Penetration Test: After completion of the installation and nominal curing of sealants, test entrances and storefronts for water leaks in accordance with ASTM E1105 at a minimum uniform static-air-pressure difference of 0.67 times the static-air-pressure difference specified for laboratory testing under "Performance Requirements" Article, but not less than 4.18 lbf/sq. ft. (200 Pa), and shall not evidence water penetration.
- B. Water Spray Test: Before installation of interior finishes has begun, a minimum area of 75 feet (23 m) by 1 story of aluminum-framed systems designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

END OF SECTION 08 41 13

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SECTION 08 42 30 – SLIDING AUTOMATIC ENTRANCE DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Exterior sliding automatic entrance door assembly at Library.

1.3 RELATED SECTIONS

- A. Section 08 71 00 - Door Hardware: Hardware to the extent not specified in this Section.
- B. Section 08 81 00 – Glazing: Materials and installation requirements of glazing for automatic entrance doors.
- C. Division 26 Sections for electrical connections including conduit and wiring for automatic entrance door operators.

1.4 DEFINITIONS

- A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.
- B. Safety Device: Device that prevents a door from opening or closing.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project and who employs a certified inspector.
- B. Manufacturer Qualifications: A qualified manufacturer with company certificate issued by AAADM.
- C. Certified Inspector: Certified by AAADM.
- D. Engineering Responsibility: Prepare data for sliding automatic entrance doors, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- E. Source Limitations: Obtain automatic entrance door assemblies through one source from a single manufacturer.

- F. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of automatic entrance door assemblies and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
 - 1. Do not modify intended aesthetic effects, except with Architect's and City's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- G. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code--Aluminum."
- H. Power-Operated Door Standard: BHMA A156.10.
- I. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- J. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.

1.6 WARRANTY

- A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of automatic entrance door assemblies that fail in materials, fabrication, or installation within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Faulty operation of operators, controls, and hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering use.
 - 2. Warranty Period: Three years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Provide automatic entrance door assemblies capable of withstanding structural loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Structural Loads:
 - 1. Wind Loads: As indicated in structural documents
 - 2. Seismic Loads: As indicated in structural documents.
- C. Thermal Movements: Provide automatic entrance doors that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures

by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Operating Range: Minus 20 deg F (29 deg C) to 130 deg F (54 deg C).
- E. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 1.25 cfm/sq. ft. (6.4 L/s x sq. m) of fixed entrance system area when tested according to ASTM E283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).
- F. Opening-Force Requirements:
1. Egress Doors: Not more than 50 lbf (222 N) required to manually set door in motion if power fails, and not more than 15 lbf (67 N) required to open door to minimum required width.
 2. Accessible Interior Doors: Not more than 5 lbf (22.2 N).
- G. Closing-Force Requirements: Not more than 30 lbf (133 N) required to prevent door from closing.

2.2 MANUFACTURERS

- A. Basis-of-Design Product: Stanley GreenStar Duraglide 2000 bi-parting with partial breakout

2.3 AUTOMATIC ENTRANCE DOOR ASSEMBLIES

- A. General: Provide manufacturer's standard automatic entrance door assemblies including doors, sidelites, framing, headers, carrier assemblies, roller tracks, door operators, activation and safety devices, and accessories required for a complete installation.
- B. Sliding Automatic Entrance Door:
1. Configuration: Bi-parting doors, with two sliding leaves and two sidelites.
 - a. Traffic Pattern: Two way.
 - b. Emergency Breakaway Capability: Partial breakout (center two leaf break out; sidelights fixed).
 - c. Mounting: Between jambs Surface.
 2. Activation Device: Motion detector mounted on each side of door header to detect pedestrians in activating zone and to open door.
 3. Safety Devices: Two photoelectric beams mounted in sidelite jambs to detect pedestrians in presence zone and to prevent door from closing.
 4. Finish: Finish framing, door(s), sidelite(s), and header with powdercoat finish matching adjacent curtain wall finish matching adjacent storefront.
 - a. Color: Match storefront and curtain wall framing system, mullion.

2.4 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.

2. Sheet and Plate: ASTM B209.
 3. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Sealants and Joint Fillers: Refer to Section 07 9200.
- C. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout; complying with ASTM C1107/C1107M; of consistency suitable for application.
- D. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil (0.76-mm) thickness per coat.

2.5 COMPONENTS

- A. Framing and Transom Members: Manufacturer's standard extruded aluminum, minimum 0.125 inch (3.2 mm) thick and reinforced as required to support imposed loads.
1. Nominal Size: As indicated on Drawings.
 2. Extruded Glazing Stops and Applied Trim: Minimum 0.062-inch (1.6-mm) wall thickness.
- B. Stile and Rail Doors: Manufacturer's standard 1-3/4-inch- (45-mm-) thick, glazed doors with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular stile and rail members. Mechanically fasten corners with reinforcing brackets that are welded, or incorporate concealed tie-rods that span full length of top and bottom rails.
1. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and manufacturer's standard preformed gaskets.
 2. Stile Design: Medium stile, 3-1/2-inch (90-mm) nominal width.
 3. Rail Design: 10-inch (254-mm) nominal height.
- C. Sidelites: Manufacturer's standard 1-3/4-inch- (45-mm-) deep sidelites with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular stile and rail members matching door design.
1. Glazing Stops and Gaskets: Same materials and design as for stile and rail door.
- D. Glazing: As specified in Section 08 81 00.
- E. Headers: Fabricated from minimum 0.125-inch- (3.2-mm-) thick extruded aluminum and extending full width of automatic entrance door units to conceal door operators, carrier assemblies, and roller tracks. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.
1. Mounting: Concealed, with one side of header flush with framing.
 2. Capacity: Capable of supporting doors up to 175 lb (79 kg) per leaf over spans up to 14 feet (4.3 m) without intermediate supports.
 - a. Provide sag rods for spans exceeding 14 feet (4.3 m).
- F. Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.

1. Rollers: Minimum two ball-bearing roller wheels and two antirise rollers for each active leaf.
- G. Threshold: Manufacturer's ADA-compliant accessible threshold members and bottom-guide track system, with stainless-steel ball-bearing-center roller wheels.
 1. Configuration: pin-guide track system at sidelites.
- H. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- I. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
- J. Caution Sign: BHMA A156.10; 6 inches (150 mm) in diameter, with minimum 1/2-inch- (13-mm-) high, black lettering on a yellow background with the words "CAUTION AUTOMATIC DOOR."
- K. Emergency Breakaway Sign: BHMA A156.10; red background with 1-inch- (25-mm-) high contrasting letters with the words "IN EMERGENCY PUSH TO OPEN."

2.6 DOOR OPERATORS

- A. General: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
 1. Door Operator Performance: Provide door operators that will open and close doors and maintain them in fully closed position when subjected to Project's design wind pressures.
- B. Electromechanical Operators: Self-contained overhead unit powered by fractional-horsepower, permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor; with solid-state microprocessor controller; UL 325; and with manual operation including spring closing with power off.
 1. Operation: Power opening and power closing.
 2. Features:
 - a. Adjustable opening and closing speeds.
 - b. Adjustable backcheck and latching.
 - c. Adjustable hold-open time between 0 and 30 seconds.
 - d. Obstruction recycle.
 - e. On-off/hold-open switch to control electric power to operator.
 - f. Energy conservation switch that reduces door-opening width.
 - g. Software: Incorporates self-diagnosing system
 3. Mounting: Concealed.

2.7 ACTIVATION AND SAFETY DEVICES

- A. Combination Motion/Presence Detectors: Self-contained units; consisting of both motion and presence detectors in a single metal or plastic housing; adjustable to provide detection field sizes and functions required by BHMA A156.10.

1. Motion Detector: K-band-frequency, microwave-scanner units; with relay hold time of not less than 2 to 10 seconds.
 - a. Provide capability for switching between bi-directional and uni-directional detection.
 - b. For one-way-traffic entrance doors, detector on egress side shall not be active when doors are fully closed.
 2. Presence Detector: Infrared-scanner units; with relay hold time of not less than 2 to 10 seconds. Detectors shall remain active at all times.
- B. Photoelectric Beams: Pulsed infrared, sender-receiver assembly for recessed mounting. Beams shall not be active when doors are fully closed.
- C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.
- D. Opening-Width Control Switch: Two-position switch that in the normal position allows sliding doors to travel to full opening width and in the alternate position reduces opening to a selected partial opening width.

2.8 HARDWARE

- A. General: Provide units in sizes and types recommended by automatic entrance door and hardware manufacturers for entrances and uses indicated. Finish exposed parts to match door finish.
- B. Emergency Breakaway Hardware: Provide release hardware that allows panel to swing out in direction of egress to full 90 degrees from any position in sliding mode. Maximum force to open panel shall be 50 lbf (222 N) according to BHMA A156.10. Interrupt powered operation of panel operator while in breakaway mode.
- C. Deadlocks: Manufacturer's standard deadbolt operated by exterior cylinder and interior thumb turn; with minimum 1-inch- (25-mm-) long throw bolt; BHMA A156.5, Grade 1.
 1. Cylinders: BHMA A156.5, Grade 1, six-pin mortise type.
 - a. Keying: Integrate into building master key system.
 2. Deadbolts: Laminated-steel hook, mortise type, BHMA A156.5, Grade 1.
- D. Automatic Locking: Electrically controlled device mounted in header that automatically locks door against sliding when in closed position. Provide fail secure operation if power fails.
 1. Include concealed, vertical-rod exit devices, UL 305, with latching into threshold and overhead carrier assembly and released by full-width panic bar push paddle; and that prevent emergency breakout doors from swinging and permit emergency egress.
- E. Sliding Weather Stripping: Manufacturer's standard replaceable components complying with AAMA 701; made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- F. Weather Sweeps: Manufacturer's standard nylon brush sweep mounted to underside of door bottom.

2.9 FABRICATION

- A. General: Factory fabricate automatic entrance door assembly components to designs, sizes, and thicknesses indicated and to comply with indicated standards.
1. Form aluminum shapes before finishing.
 2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
 3. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match framing.
 - a. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - b. Reinforce members as required to receive fastener threads.
 4. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
- B. Framing: Provide automatic entrance doors as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
1. Fabricate tubular and channel frame assemblies with manufacturer's standard welded or mechanical joints. Provide subframes and reinforcement as required for a complete system to support required loads.
 2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
 3. Form profiles that are sharp, straight, and free of defects or deformations.
 4. Prepare components to receive concealed fasteners and anchor and connection devices.
 5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
 6. Fabricate exterior components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
 7. Provide anchorage and alignment brackets for concealed support of assembly from the building structure.
 8. Allow for thermal expansion of exterior units.
- C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.
- D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.
- E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated, according to GANA's "Glazing Manual."
- F. Hardware: Factory install hardware to the greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site. Cut, drill, and tap for factory-installed hardware before applying finishes.
1. Provide sliding weather stripping, mortised into door, at perimeter of sliding doors and breakaway sidelites.

- G. Activation and Safety Devices: Factory install devices in doors and headers.
 - 1. Install photoelectric beams in vertical jambs of sidelites, with dimension above finished floor as follows:
 - a. Top Beam: 48 inches (1219 mm).
 - b. Bottom Beam: 24 inches (610 mm).

2.10 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - 1. Color: Match curtainwall framing system.
- C. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: Match adjacent curtain wall framing system.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Testing Services: Certified inspector shall test and inspect each automatic entrance door to determine compliance of installed systems with applicable BHMA standards.
 - 1. Inspection Report: Certified inspector shall submit report in writing to Architect and Contractor within 24 hours after inspection.
- B. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- D. Adjust door operators, controls, and hardware for smooth and safe operation, for weathertight closure, and complying with requirements in BHMA A156.10.

END OF SECTION 08 42 30

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SECTION 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Glazed Aluminum Curtain Walls: Exterior, pre-finished curtain wall system, complete with glazing, structural anchors, attachments, and shims

1.3 RELATED SECTIONS

- A. Section 07 92 00 – Joint Sealants: Installation of joint sealants installed with glazed aluminum curtain-wall systems and for sealants to the extent not specified in this Section.
- B. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts.
- C. Section 08 81 00 – Glazing: Insulating-glass requirements.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Provide aluminum entrances and storefront systems produced by a firm experienced in manufacturing systems that are similar to those indicated for this project and that have a record of successful in-service performance.
- B. Installer Qualifications: Capable of assuming engineering responsibility and performing Work of this Section and who is acceptable to manufacturer.
 - 1. Engineering Responsibility: Preparation of data for glazed aluminum curtain-wall systems including the following:
 - a. Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.
 - b. Shop Drawings, Project-specific preconstruction-testing program development, and comprehensive engineering analysis by a qualified professional engineer.
- C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of glazed aluminum curtain walls that are similar to those indicated for this Project in material, design, and extent.
- D. Single Source Responsibility: Obtain aluminum entrance and storefront systems from one source and from a single manufacturer.

- E. Maintain continuous air and vapor barrier throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
- F. Welding Standards: As follows:
 - 1. AWS D1.2, "Structural Welding Code—Aluminum".
 - 2. AWS D1.3, "Structural Welding Code—Steel Sheet".
 - 3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5 MOCKUPS

- A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution and set quality standards for fabrication and installation.
 - 1. Build full thickness, including face and backup as indicated on Drawings.
 - 2. Prepare mockup for review during preinstallation meeting.
 - 3. Coordinate glazed aluminum curtain wall mockup with adjoining materials as specified in Section 01 4339.
 - 4. Obtain Architect's approval before initiating full building construction.
 - 5. Prepare mock-up with the same products, tools, equipment and techniques required for the actual applications and employing same workers who will install the system. The finish used shall be from the same batch that is being used on the project.
 - 6. Protect approved mockups from the elements with weather-resistant membrane and retain mockup as a basis for approval of completed installation. Properly dispose of mockup at completion and acceptance of Project.
 - 7. If Architect determines mockups do not comply with requirements, reconstruct mockups until mockups are approved.

1.6 WARRANTY

- A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain-wall systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals and other materials beyond normal weathering.
 - d. Water leakage.
 - e. Failure of operating components to function normally.
 - 2. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design glazed aluminum curtain walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. General Performance: Comply with performance requirements specified, as determined by testing of manufacturer's standard glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Glazed aluminum curtain walls shall withstand movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.

2.2 STRUCTURAL LOADS:

- 1. Wind Loads:
 - a. Basic Wind Speed: As indicated on Structural Documents.
 - b. Importance Factor: As indicated on Structural Documents.
 - c. Exposure Category: As indicated on Structural Documents.
- B. Structural-Test Performance: Test according to ASTM E330 as follows:
 - 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 - 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- C. Deflection of Framing Members: At design wind pressure, as follows:
 - 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding $L/175$ of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to $L/360$ of clear span or 1/8 inch (3.2 mm), whichever is smaller.
 - 3. Operable Units: Provide a minimum 1/16-inch (1.6-mm) clearance between framing members and operable units.
- D. Cantilever Deflection: Where framing members overhang an anchor point, limit deflection to two times the length of cantilevered member, divided by 175.

- E. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. Component Importance Factor is indicated on Structural Drawings.
- F. Story Drift: Accommodate design displacement of adjacent stories indicated.
 - 1. Design Displacement: As indicated on Drawings.
 - 2. Test Performance: Meeting criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement.
- G. Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
- H. Water Penetration under Dynamic Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to AAMA 501.1 at Dynamic Pressure equal to 20 percent of positive wind-load design pressure but not less than 6.24 lbf/sq. f.t.
 - 1. Maximum Water Leakage: : According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters that is drained to exterior.
- I. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
 - 2. Test Interior Ambient-Air Temperature: 75 deg F (24 deg C).
 - 3. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
- J. Energy Performance: Glazed aluminum curtain walls shall have certified and labeled energy performance ratings in accordance with NFRC.
- K. Air Infiltration:
 - 1. Maximum air leakage through fixed glazing and framing areas of 0.30 cfm/sq. ft. (1.50 L/s per sq. m) of fixed wall area as determined according to ASTM E283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft. (300 Pa).
 - 2. Pair of Entrance Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
 - 3. Single Entrance Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
- L. Structural-Sealant Joints: Use neutral-cure silicone sealants with insulated glass units. Type shall be as recommended by sealant and system manufacturers that complies with ASTM C1184 requirements and is compatible with system components with which it comes in contact, and is specifically formulated and tested for use as a structural sealant.
 - 1. Designed to carry gravity loads of glazing.
 - 2. Designed to produce tensile or shear stress of less than 20 psi.
- M. Structural-Sealant Joints: Use neutral-cure silicone sealants with insulated glass units.

1. Type shall be as recommended by sealant and system manufacturers that complies with
2. ASTM C1184 requirements and is compatible with system components with which it
3. comes in contact, and is specifically formulated and tested for use as a structural
4. sealant.
 - a. Designed to carry gravity loads of glazing.
 - b. Designed to produce tensile or shear stress of less than 20 psi.

2.3 CURTAIN WALL SYSTEM COMPONENTS

- A. Basis-of-Design Product: Kawneer 1620.
 - a. Corner Window: SSG System structural silicone glazing, 2" x 7-1/2" mullion.
 - b. System throughout except Corner Window: Mechanically captured glazing, 2" x 7-1/2" mullion.
2. Corner: Butt glazed; 45 degree mullion.
- B. Beauty Caps: Finish: Match curtain wall.
- C. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 1. Construction: Thermally broken.
 2. Glazing System: Retained mechanically with gaskets on four sides.
 3. Glazing Plane: Front set.
 4. Finish: high performance organic finish. Match Architect's sample approved by Owner. Match Storefront, Interior Aluminum doors and window frames
- D. Beauty Caps: Manufacturer's standard aluminum components that mechanically retain glazing. Include snap-on aluminum trim that conceals fasteners.

2.4 FRAMING SYSTEMS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 1. Sheet and Plate: ASTM B209 (ASTM B209M).
 2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B221 (ASTM B221M).
 3. Extruded Structural Pipe and Tubes: ASTM B429.
 4. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
 2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
 3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 2. Reinforce members as required to receive fastener threads.
 3. Use exposed fasteners with countersunk Phillips screw heads.
 4. Finish exposed portions to match framing system.
 5. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
- E. Anchors: Three-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.
- F. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- G. Framing Gaskets and Sealants: As recommended by manufacturer for joint type.
1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 CURTAIN WALL SYSTEM COMPONENTS

- A. Curtain Wall System; ASTM B221, 6063-T5 extruded aluminum framing, with structural silicone glazed horizontals, sections at wider sightline with two horizontal mullions and a common exterior cover as indicated on Drawings.
- B. Curtain-Wall Framing: Fabricate components for assembly using shear-block system head-and-sill-receptor system with shear blocks at intermediate horizontal members.
- C. Anchorages: Anchorage attachments and shims required to secure window walls to building tube steel structural system; complete with matching flush stops of profile to suit frames and of adequate size to provide sufficient bite on glass panels; drilled holes, deflector plates and internal flashings to accommodate internal weep and drainage system.
- D. Structural Steel Reinforcement and Tubular Framing: ASTM A653/653M, hot-dip galvanized after fabrication. Touch up abraded surfaces after installation.
- E. Glazing Materials: Type recommended by window wall manufacturer to suit locations and applications. Tempered glass shall be manufactured by a tongless method.
- F. Anchorage Devices: Type recommended by window wall manufacturer to suit locations and applications.
- G. Spacers and Setting Blocks: Manufacturer's standard elastomeric type in hardness recommended by system and gasket manufacturer to comply with system performance requirements.
1. Color: Black.

2.6 GLAZING SYSTEMS

- A. Glazing: As specified in Section 08 81 00.
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
 - 1. Structural Sealant: ASTM C1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
 - a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 100 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Glass to Mullion Sealant Color: Black.
 - c. Butt-joint Glass Sealant Color: Clear.
 - 2. Weatherseal Sealant: ASTM C920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
 - a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Color: Matching structural sealant.
- D. Secondary Sealants and Joint Fillers: For use as weatherseal at perimeter of entrance and storefront systems, compatible with sealant and other system components with which it comes in contact, as listed in Section 07 92 00.
 - 1. Color: As selected by Architect and Owner from manufacturer's full range of colors.

2.7 INSULATED SPANDREL PANEL

- 1. Basis-of-Design: Mapes SSG insulated with wrapped edges, vertical butt joint at capless vertical mullion.
- 2. Laminated, metal-face flat panels with no deviations in plan exceeding 0.8 percent of panel dimension in width or length
 - a. Overall Panel thickness: 1”
 - b. Edge: wrapped
 - c. Exterior Skin: Aluminum, Custom PVDF to match curtainwall framing system, mullion color, smooth
 - d. Interior Skin: Aluminum, Custom PVDF to match curtainwall framing system, mullion color, smooth
 - e. Thermal Insulation Core: EPS
 - f. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1) Flame-Spread Index: 25 or less.
 - 2) Smoke-Developed Index: 250 or less.

2.8 FABRICATION

- A. Form aluminum shapes before finishing.
- B. Fabricate components that, when assembled, have the following characteristics:
 - 1. Sharp profiles, straight and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to prevent glazing-to-glazing contact and to maintain required glazing edge clearances.
 - 6. Provisions for reglazing from interior for vision glass and exterior for spandrel glazing or panels.
- C. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- D. Fabricate curtain wall system to allow for adequate clearances around perimeter of system to enable proper installation. Fabricate to allow for thermal movement within curtain wall construction.
- E. Fabricate curtain wall components allowing for accurate and rigid fit of joints and corners. Match components carefully ensuring continuity of line and design. Ensure joints and connections will be flush, hairline and weatherproof.
- F. Provide structural reinforcing within framing members where required to maintain rigidity and as required to accommodate design loads.
- G. System shall provide weep drainage to the outside.
- H. Make provision for hardware and provide required internal reinforcing.
- I. Apply coat of bituminous paint on concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.9 FINISHES

- A. Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Color and Gloss: TBD.
- B. Hardware Finish: To be selected.
- C. Concealed Steel Items: Galvanized in accordance with ANSI/ASTM A123 to 2.0 oz/sq ft.

2.10 STEEL PRIMING

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.
- B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.
- C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

- A. Seal joints watertight, unless otherwise indicated.

3.2 FIELD QUALITY CONTROL

- A. Structural-Sealant Compatibility and Adhesion: Structural sealant shall be tested according to recommendations in ASTM C1401.
 - 1. Destructive Test Method A, "Hand Pull Tab (Destructive)," in ASTM C1401, Appendix X2, shall be used.
 - a. A minimum of six areas on each building face shall be tested.
 - b. Repair installation areas damaged by testing.
- B. Structural-Sealant Glazing Inspection: After installation of aluminum-framed systems is complete, structural-sealant glazing shall be inspected and evaluated according to recommendations in ASTM C1401.
- C. Water Penetration: Areas shall be tested according to ASTM E1105 at a minimum uniform and cyclic static-air-pressure difference of 0.67 times the static-air-pressure difference specified for laboratory testing under "Performance Requirements" Article, but not less than 4.18 lbf/sq. ft. (200 Pa), and shall not evidence water penetration.
- D. Water Spray Test: Before installation of interior finishes has begun, a minimum area of 75 feet (23 m) by 1 story of aluminum-framed systems designated by Architect and Owner shall be tested according to AAMA 501.2 and shall not evidence water penetration.

3.3 DEMONSTRATION

- A. Water Penetration Test: After completion of the installation and nominal curing of sealants, test entrances and storefronts for water leaks in accordance with ASTM E1105.

END OF SECTION 08 44 13

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SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. This Section includes the following, but is not necessarily limited to:
 - 1. Door Hardware, including electric hardware.
 - 2. Storefront and Entrance door hardware.
 - 3. Wall or floor-mounted electromagnetic hold-open devices.
 - 4. Power supplies for electric hardware.
 - 5. Low-energy door operators plus sensors and actuators.
 - 6. Thresholds, gasketing and weather-stripping.
- C. Related Sections: The following sections are noted as containing requirements that relate to this Section, but may not be limited to this listing.
 - 1. Division 8: Section – Hollow Metal Doors and Frames.
 - 2. Division 8: Section - Flush Wood Doors.
 - 3. Division 8: Section - Aluminum Storefront.
 - 4. Division 28: Section - Fire/Life-Safety Systems & Security Access Systems.

1.3 REFERENCES

- A. 2019 California Building Code, CCR, Title 24.
- B. BHMA – Builders' Hardware Manufacturers Association
- C. CCR – California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.
- D. DHI – Door and Hardware Institute
- E. NFPA - National Fire Protection Association.
 - 1. NFPA 80 - Fire Doors and Other Opening Protectives
 - 2. NFPA 105 - Smoke and Draft Control Door Assemblies
- F. UL - Underwriters Laboratories.
 - 1. UL 10C - Fire Tests of Door Assemblies
 - 2. UL 305 - Panic Hardware
- G. WHI - Warnock Hersey Incorporated
- H. SDI - Steel Door Institute

1.4 QUALITY ASSURANCE

- A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.

- B. **Supplier Qualifications:** A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
1. Responsible for detailing, scheduling and ordering of finish hardware.
 2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing.
 3. Stock parts for products supplied and are capable of repairing and replacing hardware items found defective within warranty periods.
- C. **Hardware Installer:** Company specializing in the installation of commercial door hardware with five years documented experience.
- D. **Fire-Rated Openings:** Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.
1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".
- E. **Exit Doors:** Operable from inside with single motion without the use of a key or special knowledge or effort.
- F. **Product packaging** to be labelled in compliance with CA Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986.
- G. **Keying Conference:** Conduct conference to comply with requirements in Division 01 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, cylinders cores and software.
 5. Address and requirements for delivery of keys.
- H. **Pre-Submittal Conference:** Conduct coordination conference in compliance with requirements in 01 31 00 Project Management and Coordination 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 shall be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training shall 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.

1.5 WARRANTY

- A. Provide warranties of respective manufacturers’ regular terms of sale from day of project acceptance as follows:
 - 1. Locksets: Three (3) years - “ND” Ten (10) years.
 - 2. Electronic: One (1) year.
 - 3. Closers: Thirty (30) years.
 - 4. Exit devices: Three (3) years.
 - 5. All other hardware: Two (2) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

<u>Item</u>	<u>Manufacturer</u>	<u>Acceptable Substitutes</u>
Hinges	Ives	Hager, Stanley, McKinney
Locks, Latches & Cylinders	Schlage	Owner Standard
Exit Devices	Von Duprin	Owner Standard
Closers	LCN	Owner Standard
Push, Pulls & Protection Plates	Ives	Trimco, BBW, DCI
Flush Bolts	Ives	Trimco, BBW, DCI
Stops	Ives	Trimco, BBW, DCI
Overhead Stops	Glynn-Johnson	Or Approved Equal
Thresholds	Zero	Pemko, National Guard
Seals & Bottoms	Zero	Pemko, National Guard

2.2 GENERAL

- A. Provide door hardware for each door to comply with room and door operations and each referenced section that products are to be supplied under.
- B. Door hardware shall be code compliant, heavy-duty type, and shall include ADA-compliant lever trim and fully mortised locksets, hinges, exit devices, closers, stops and holders, thresholds, sweeps, protective trim, seals & gasketing and other miscellaneous door hardware as required by Code and to meet operational and functional requirements of doors. Sound seal and door bottoms shall be installed in rooms requiring added acoustical privacy and in all Utility rooms.

- C. Electrified hardware shall be installed on all doors with access control systems (e.g. card readers). Coordinate power for electric door hardware items.
- D. Means of Egress doors shall be provided with panic and fire exit hardware as required by Code.
- E. Where a smoke or fire door must remain open under normal conditions (fail safe), select a hardware set that has a magnetic hold-open or, a combination closer-holder instead of a closer only. Magnetic hold-opens and closer-holders must be connected to the fire alarm system. Coordinate provision of alarm contacts.
- F. Keying system shall be compatible with City standard.
- G. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware as required. Products are identified by using door hardware designations, as follows:
- H. 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.

2.3 MATERIALS

- A. Hinges: Exterior out-swinging door butts shall be non-ferrous material and shall have stainless steel hinge pins. All doors to have non-rising pins. Provide ball bearing hinges at all exterior doors and doors with closers.
 - 1. Hinges shall be sized in accordance with the following:
 - a. Height:
 - 1) Doors up to 42" wide: 4-1/2" inches.
 - 2) Doors 42" to 48" wide: 5 inches.
 - b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
 - c. Number of Hinges: Furnish 3 hinges per leaf to 7'-5" in height. Add one for each additional 2 feet in height.
 - 2. Furnish non-removable pins (NRP) at all exterior out-swing doors and interior key lock doors with reverse bevels.
- B. Pivots: High strength forgings and castings with precision bearings for smooth operation. Positive locking vertical adjustment mechanism to allow installer to precisely position the door and balance the load.
- C. Continuous Hinges: As manufactured by Ives, an Allegion Company. UL rated as required.
- D. Heavy Duty Cylindrical Locks and Latches: Schlage "ND" Series as scheduled with "Sparta" design, fastened with through-bolts and threaded chassis hubs.
 - 1. Provide cylindrical locksets exceeding the ANSI/BHMA A156.2 Grade 1 performance standards for strength, security, and durability in the categories below:
 - a. Abusive Locked Lever Torque Test – minimum 3,100 inch-pounds without gaining access
 - b. Offset lever pull – minimum 1,600 foot pounds without gaining access
 - c. Vertical lever impact – minimum 100 impacts without gaining access
 - 2. Cycle life - tested to minimum 16 million cycles per ANSI/BHMA A156.2 Cycle Test with no visible lever sag or use of performance aids such as set screws or spacers
 - 3. UL 10C for 4'-0" x 10'-0" 3-hour fire door.

4. Cylinders: Refer to “KEYING” article, herein.
 5. Provide solid steel anti-rotation through bolts and posts to control excessive rotation of lever.
 6. Provide lockset that allows lock function to be changed to over twenty other common functions by swapping easily accessible parts.
 7. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw capable of UL listing of 3 hours on a 4’ x 10’ opening. Provide proper latch throw for UL listing at pairs.
 8. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
 9. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
 10. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 11. Provide wired electrified options as scheduled in the hardware sets.
 - a. 12 through 24 volt DC operating capability, auto-detecting
 - b. Selectable EL (fail safe)/EU (fail secure) operating mode via switch on chassis
 - c. 0.230A (230mA) maximum current draw
 - d. 0.010A (10mA) holding current
 - e. Modular / “plug in” request to exit switch
 12. Lever Trim: Solid cast levers without plastic inserts, and wrought roses on both sides.
- E. Schlage “L” Series as scheduled with “17” Style Lever and “A” Style Rose.
1. Locksets to comply with ANSI A156.13, Series 1000, Operational Grade 1 and Security Grade 1 with all standard trims. Locksets shall also comply with UL10C Positive Pressure requirements
 2. Lock case shall be manufactured with heavy 12 gauge steel with fully wrapped design. Lock cases with exposed edges are not acceptable. Lock case shall be multi-functional allowing transformation to a different function without opening lock case.
 3. Latchbolt shall have 3/4” throw and be non-handed, field reversible without opening the lock case. Solid latchbolts and / or plastic anti-friction devices are not acceptable.
 4. The deadbolt, when used, shall be 1” throw stainless steel with a 3/4” internal engagement when fully extended.
 5. All trim shall be through-bolted with the spring cages supporting the trim attached to the lock cases to prevent torqueing.
 6. Levers to have independent rotation in both directions. Exterior lever assembly to be one-piece design attached by threaded bushing. Interior lever assembly shall be attached by screwless shank
 7. Thru-bolt lever assemblies through the door for positive interlock. Locks using a through the door spindle for attachment are not acceptable. Spindles shall be independent, designed to “break-away” at a maximum of 75psi torque.
 8. Hand of lock chassis to be changeable by simply moving one screw from one side to the case to the other and pulling and reversing the latchbolt.
 9. Cylinders to be secured by a cast stainless steel, dual retainer. Locks utilizing screws and / or stamped retainers are not acceptable.
- F. Deadlocks: Rotating cylinder trim rings of attack-resistant design. Mounting plates and actuator shields of plated cold-rolled steel. Mounting screws of 1/4” diameter steel and protected by drill-resistant ball bearings. Steel alloy deadbolt with hardened steel roller.

Strike alloy deadbolt with reinforcer and two 3" long screws. ANSI A156.5, 2001 Grade 1 certified.

- G. Exit devices: Von Duprin as scheduled.
1. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 - 2001 standards.
 2. All internal parts shall be of cold-rolled steel with zinc dichromate coating.
 3. Mechanism case shall have an average thickness of .140".
 4. Compression spring engineering.
 5. Non-handed basic device design with center case interchangeable with all functions.
 6. All devices shall have quiet return fluid dampeners.
 7. All latchbolts shall be deadlocking with ¾" throw and have a self-lubricating coating to reduce friction and wear.
 8. Device shall bear UL label for fire and or panic as may be required.
 9. All surface strikes shall be roller type and utilize a plate underneath to prevent movement.
 10. Lever Trim: "Breakaway" design, forged brass or bronze escutcheon with a minimum of .130" thickness, match lockset lever design.
 11. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key.
 12. Furnish glass bead kits for vision lites where required.
 13. All Exit Devices to be sex-bolted to the doors.
 14. Panic Hardware shall comply with CBC Section 11B.404.2.7 and shall be mounted between 34" and 44" above the finished floor surface.
 - a. Provide exit devices UL certified to meet maximum 5 pound requirements according to the California Building Code section 11B-309.4, and UL listed for Panic Exterior Fire Exit Hardware.
- H. Closers: LCN or approved equal. Place closers inside building, stairs, room, etc.
1. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
 2. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 11/16 inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.
 3. All parallel arm closers shall incorporate one piece solid forged steel arms with bronze bushings. 1-9/16" steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All other closers to have forged steel main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.
 4. All parallel arm closers so detailed shall provide advanced backcheck for doors subject to severe abuse or extreme wind conditions. This advanced backcheck shall be located to begin cushioning the opening swing of the door at approximately 45 degrees. The intensity of the backcheck shall be fully adjustable by tamper resistant non-critical screw valve.
 5. Closers shall be installed to permit doors to swing 180 degrees.
 6. All closers shall utilize a stable fluid withstanding temperature range of 120 degrees F. to -30 degrees F. without requiring seasonal adjustment of closer speed to properly close the door.
 7. Provide the manufactures drop plates, brackets and spacers as required at narrow head rails and special frame conditions. NO wood plates or spacers will be allowed.

8. Maximum effort to operate closers shall not exceed 5 lbs., such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. When fire doors are required, the maximum effort to operate the closer may be increased but shall not exceed 15 lbs. when specifically approved by fire marshal. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position. Per 11B-404.2.8.1, door shall take at least 5 seconds to move from an open position of 90 degrees to a position of 12 degrees from the latch jamb.
- I. Flush Bolts & Dust Proof Strikes: Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.
 1. Manual flush bolts only permitted on storage or mechanical openings as scheduled.
 2. Provide dust proof strikes at openings using bottom bolts.
- J. Door Stops:
 1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
 2. Do not install floor stops more than four (4) inches from the face of the wall or partition per 2019 CBC.
 3. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
- K. Protection Plates: Fabricate either kick, armor, or mop plates with four beveled edges. Provide kick plates 10" high and 2" LDW. Sizes of armor and mop plates shall be listed in the Hardware Schedule. Furnish with machine or wood screws of bronze or stainless to match other hardware.
- L. Thresholds: As Scheduled and per details.
 1. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope.
 2. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 7 "Thermal and Moisture Protection".
 3. Use 1/4" fasteners, red-head flat-head sleeve anchors (SS/FHSL).
 4. Thresholds shall comply with CBC Section 11B-404.2.5.
- M. Seals: Provide silicone gasket at all rated and exterior doors.
 1. Fire-rated Doors, Resilient Seals: UL10C Classified complies with NFPA 80 & NFPA 252. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements.
 2. Fire-rated Doors, Intumescent Seals: Furnished by selected door manufacturer. Furnish fire-labeled opening assembly complete and in full compliance with UL10C Classified complies with NFPA 80 & NFPA 252. Where required, intumescent seals vary in requirement by door type and door manufacture -- careful coordination required.
 3. Smoke & Draft Control Doors, Provide UL10C Classified complies with NFPA 80 & NFPA 252 for use on "S" labeled Positive Pressure door assemblies.

2.4 KEYING

- A. Furnish a Proprietary Schlage masterkey system as directed by the owner or owner's representative. Key system to be designated and combined by the Schlage Master Key Department even if pinned by the Authorized Key Center, Authorized Security Center or a local authorized commercial dealer.
- B. A detailed keying schedule is to be prepared by the DBE in consultation with the Owner and a representative of Allegion or an Authorized Key Center or Authorized Security Center. Each keyed cylinder on every keyed lock is to be listed separately showing the door #, key group (in BHMA terminology), cylinder type, finish and location on the door.
- C. Furnish all cylinders in the Schlage Full Size Interchangeable Core, Everest D123 keyway. Pack change keys independently (PKI).
- D. Furnish construction keying for doors requiring locking during construction.
- E. Furnish all keys with visual key control. (Not all options listed below are available at the same time.)
 - 1. Stamp key "Do Not Duplicate".
 - 2. Stamp (BHMA) key symbol on key.
 - 3. Delete key "bitting" from the key bow.
- F. Furnish all cylinders with visual key control. (Not all options listed below are available at the same time.)
 - 1. Stamp (BHMA) key symbol on face of cylinder plug (VKC).
- G. Furnish mechanical keys as follows:
 - 1. Furnish 2 cut change keys for each different change key code.
 - 2. Furnish 1 uncut key blank for each change key code.
 - 3. Furnish 6 cut masterkeys for each different masterkey set.
 - 4. Furnish 3 uncut key blanks for each masterkey set.
 - 5. Furnish 2 cut control keys cut to the top masterkey for permanent I/C cylinders.
 - 6. Furnish 1 cut control key cut to each SKD combination.
 - 7. Furnish KS43D2200 padlock for use with non-I/C Schlage cylinders. Furnish 47-413 (conventional) or 47-743-XP (PrimusXP) with above.
 - 8. Furnish KS43G3200 padlock for use with FSIC Schlage cylinders. Furnish 23-030 (Classic / Everest) or 20-740 (PrimusXP) with above.
 - 9. Furnish KS41D1200 padlock for use with SFIC Schlage cylinders. Furnish 80-037 (Everest-B) with above.
- H. Furnish Schlage Padlocks and the cylinders to tie them into the masterkey system for gates, storage boxes, utility valve security, roof hatches and roll-up doors keyed as directed in the keying schedule.
 - 1. Furnish KS43D2200 padlock for use with non-I/C Schlage cylinders. Furnish 47-413 (conventional) or 47-743-XP (PrimusXP) with above.
- I. Furnish one Schlage cabinet lock for each cabinet door or drawer so designated on the drawings or keying schedule to match the masterkey system.
 - 1. Furnish CL100PB for use with non-I/C Schlage cylinders.

2.5 FINISHES

- A. Generally to be brushed chrome (626 on bronze/brass and 652 on steel) unless otherwise noted. Where located at curtainwall, aluminum-framed interior or exterior entrances and storefronts, exposed hardware to match door color.
- B. Door closers shall be powder-coated to match other hardware, unless otherwise noted. Where located at curtainwall, aluminum-framed interior or exterior entrances and storefronts, exposed hardware to match door color.
- C. Aluminum items to be finished anodized aluminum except thresholds which can be furnished as standard mill finish.

2.6 FASTENERS

- A. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.
- B. Screws for butt hinges shall be flathead, countersunk, full-thread type.
- C. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
- D. Provide expansion anchors for attaching hardware items to concrete or masonry.
- E. All exposed fasteners shall have a phillips head.
- F. Finish of exposed screws to match surface finish of hardware or other adjacent work.
- G. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.
- C. Fire-Rated Door Assembly Inspection: Upon completion of the installation, all fire door assemblies shall be inspected to confirm proper operation of the closing device and latching device and that only the manufacturer's furnished fasteners are used for installation and that it meets all criteria of a fire door assembly per NFPA 80 (Standard for Fire Doors and Other Opening Protectives) 2019 Edition. A written record shall be maintained and transmitted to the Owner to be made available to the Authority Having Jurisdiction (AHJ). The inspection of the swinging fire doors shall be performed by a certified FDAI (Fire Door Assembly Inspector) with knowledge and understanding of the operating components of the type of door being subjected to the inspection. The record shall list each fire door assembly throughout the project and include each door number, an itemized list of hardware set components at each door opening, and each door location in the facility.

3.2 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and requirements of DHI.
- B. Use the templates provided by hardware item manufacturer.
- C. Mounting heights for hardware shall be as recommended by the Door and Hardware Institute. Operating hardware will to be located between 34" and 44" AFF.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set thresholds for exterior doors in full bed of butyl-rubber sealant.
- G. If hand of door is changed during construction, make necessary changes in hardware at no additional cost.

- H. Hardware Installer shall coordinate with security contractor to route cable to connect electrified locks, panic hardware and fire exit hardware to power transfers or electric hinges at the time these items are installed so as to avoid disassembly and reinstallation of hardware.
- I. Hardware Installer shall also be present with the security contractor when the power is turned on for the testing of the electronic hardware applications. Installer shall make adjustments to solenoids, latches, vertical rods and closers to insure proper and secure operation.
- J. All wiring for electro-mechanical hardware mounted on the door shall be connected through the power transfer and terminated in the interface junction box specified for in the Electrical Section.
- K. Conductors shall be minimum 18 gage stranded, multicolored. A minimum 12 in. loop of conductors shall be coiled in the interface junction box. Each conductor shall be permanently marked with its function.
- L. If a power supply is specified in the hardware sets, all conductors shall be terminated in the power supply. Make all connections required for proper operation between the power supply and the electro-mechanical hardware. Provide the proper size conductors as specified in the manufacturer's technical documentation.

3.3 HARDWARE LOCATIONS

- A. Conform to CCR, Title 24, Part 2; and ADAAG; and the drawings for access-compliant positioning requirements for the disabled.

END OF SECTION 08 71 00

SECTION 08 81 00 – GLASS GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Glass in the following locations:
 - 1. Aluminum storefront.
 - 2. Curtain wall system.
 - 3. Interior aluminum-framed doors and windows.
 - 4. Exterior doors, including storefront doors, automatic sliding entry doors and folding metal doors.
 - 5. Interior borrowed lites and interior doors.
- B. Glass of the following types:
 - 1. Monolithic.
 - 2. Insulated.
 - 3. Laminated.
 - 4. Fire rated.
 - 5. Mirror glass.

1.3 RELATED SECTIONS

- A. Section 08 11 13 – Hollow Metal Doors and Frames.
- B. Section 08 11 16 – Aluminum Door and Window Frames.
- C. Section 08 13 76 – Folding Metal Doors
- D. Section 08 14 16 – Flush Wood Doors.
- E. Section 08 41 13 – Aluminum Framed Entrances and Storefronts
- F. Section 08 42 30 – Sliding Automatic Entrances
- G. Section 08 44 13 – Glazed Aluminum Curtain walls

1.4 DEFINITIONS

- A. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

- B. Deterioration of Laminated Glass: Development of manufacturing defects including edge separation or delamination which materially obstructs vision through glass.
- C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- D. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.
- E. Sealed Insulating Glass Unit Surfaces:
 - 1. Surface No. 1: Exterior surface of outer lite.
 - 2. Surface No. 2: Interior surface of outer lite.
 - 3. Surface No. 3: Exterior surface of inner lite.
 - 4. Surface No. 4: Interior surface of inner lite.

1.5 QUALITY ASSURANCE

- A. Glazier Qualifications: Engage an experienced glazier who has completed glazing similar in material, design, and extent to that required for this Project, with a record of successful in-service performance.
- B. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. FGMA Publications: "FGMA Glazing Manual."
 - 2. LSGA Publications: "LSGA Design Guide."
 - 3. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.
- C. Single-Source Responsibility for Glass: Obtain glass from one source for each product indicated below:
 - 1. Primary glass of each (ASTM C1036) type and class indicated.
 - 2. Heat-treated glass of each (ASTM C1048) condition indicated.
 - 3. Laminated glass of each (ASTM C1172) kind indicated.
 - 4. No visible strain pattern to the naked eye under various lighting conditions as judged by the Architect and Owner.
- D. Fabricator Qualifications: Shop that employs skilled, manufacturer-certified workers who custom fabricate glass similar to that required for this Project and whose products have a record of successful in-service performance.
- E. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction
 - 1. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- F. Insulating Glass Certification Program: Provide insulating glass units permanently marked with appropriate Insulating Glass Certification Council (IGCC) certification label.

- G. Mockups: Before installing glazing, build mockups for each type of glass and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects, quench pattern visibility both under natural viewing and polarized viewing conditions, and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - a. Use full size glass units to demonstrate fabrication techniques and quality.
 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before starting glass fabrication.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Demolish and remove mockups when directed.
 7. Rejection: If strain pattern or any other pattern that is not intended or approved is visible to the naked eye, as judged solely by the Architect, the glass will be rejected.

1.6 WARRANTY

- A. Laminated Glass: Furnish written warranty signed by glass manufacturer, agreeing to furnish replacements for those laminated glass units which develop manufacturing defects as defined.
1. Warranty Period: 5-years from date of Substantial Completion.
- B. Insulating Glass: Furnish written warranty signed by glass manufacturer, agreeing to furnish replacements for those insulating glass units developing manufacturing defects as defined.
1. Warranty Period: 10-years from date of Substantial Completion.
- C. Mirror Glass: Furnish written warranty agreeing to furnish replacement mirrors for those units developing silver spoilage.
1. Warranty Period: 15-years from date of Substantial Completion.
- D. These warranties shall be in addition to and not a limitation of other rights the City may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Source Limitation for Glass: obtain from single source from single manufacturer for each glass type.
2. Source Limitation for Glazing accessories: Obtain from a single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. Energy Performance Requirements: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor):

2. Fixed Glazing and Framing: Shall have U-factor of not more than 0.38 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
- B. Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
 1. Normal thermal movement is defined as that resulting from an ambient temperature range of 120-deg. F. and from a consequent temperature range within glass and glass framing members of 180-deg. F.
 - C. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strength required to meet or exceed the following criteria:
 1. Glass thickness: Select minimum glass thicknesses to comply with ASTM E1300
 - D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
 1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 3. For laminated-glass lites, properties are based on products of construction indicated.
 4. Tempered Glass Coatings: Apply Low-E, frit, and other specified coatings to glass only after tempering to minimize quench pattern visibility.
 - E. Provide mirrored glass that will not fail under normal usage. Failure includes glass breakage and deterioration attributable to defective manufacture, fabrication, and installation.
 - F. VOC Content: Welding and coatings applied on-site on the interior of the building and products used on the interior of the building shall comply with VOC limits as specified in Section 01 8113 - Sustainable Design Requirements.
 1. Use materials that have the lowest possible VOC content in units of g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 PRIMARY FLOAT GLASS PRODUCTS

- A. Uncoated Clear Float Glass: ASTM C1036, Condition A (uncoated surfaces), Type I (transparent glass, flat), Quality q3 (glazing select), class and kind as indicated in schedule at the end of Part 3.
- B. Spandrel Glass: ASTM C1048, Condition B (spandrel glass, one-surface ceramic coated), Type I (transparent glass, flat), Quality q3 (glazing select), complying with other requirements of Insulating-Glass Units. Basis of Design: Mapes Mapespan Spandrel Glass Panel, surface 3+4. (Low-e coating required on surface 2).
- C. Mirror Glass: ASTM C1503, Type I (transparent glass, flat), Class 1 (clear), 1/4-inch thick with smooth round safety edge, and Quality q2 (mirror), with silvering, electro-plated

copper coating, and protective organic coating, beveled edges. Attach to walls with mechanical cleat-type anchors to metal studs or solid backing and apply mirror adhesive.

- D. Monolithic Acoustic Glass: ASTM C1036, Condition A (uncoated surfaces), Type I (transparent glass, flat), Quality q3 (glazing select).
 - 1. Laminate Layer: Saflex; Silent Glass Q Series interlayer.
 - 2. STC: 37dB.
- E. Heat-Treated Float Glass: ASTM C1048, Type I (transparent glass, flat), Quality q3 (glazing select), class and kind as required.
- F. Safety Glass: ASTM C1048, fully tempered with horizontal tempering, Condition A uncoated, Type 1 transparent flat, Class 1 clear, Quality q3 glazing select; conforming to ANSI Z97.1; thickness as indicated.
- G. Insulating-Glass Units: ASTM E2190, Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace.
 - 1. Basis-of-design: PPG Industries, Solarban 72 Starphire
 - a. Visible Light Transmittance: 68 percent.
 - b. Shading Coefficient: 0.32.
 - c. Solar Heat Gain Coefficient: 0.28.
 - d. Winter Nighttime U Value: 0.28.
 - e. Summer Daytime U-Value: 0.26.
 - f. LSG Ratio: 2.37.
 - g. Assembly U Value: 0.42 (thermally broken frame).
 - h. Assembly SHGC: 0.28.
 - 2. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
 - 3. Spacer: Thermally broken aluminum with black, color anodic finish or black powdered metal paint finish.
 - 4. Desiccant: Molecular sieve or silica gel, or blend of both.

2.4 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 for window assemblies; NFPA 252 for door assemblies.
- B. Monolithic Ceramic Glazing: Clear, ceramic flat glass; 3/16-inch (5-mm) nominal thickness.
 - 1. Basis-of-Design Product: Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); Standard FireLite.
 - 2. Rating: as required per condition, per Authority Having Jurisdiction

2.5 TYPES

- A. Glazing at Windows, See Systems Criteria Architecture
 - 1. Exterior
 - a. Type A: 1" Insulated Glazing Unit with Vitro Solarban 72 on Starphire glass
 - b. Type AT: Tempered 1" Insulated Glazing Unit with Vitro Solarban 72 on Starphire glass

- c. Type S: Curtainwall Insulated Infill Metal Seamless Structurally Glazed (SSG) Panel. Basis of Design: Mapes insulated SSG with wrapped edges. Color: custom to match mullion color.
 - 2. Interior
 - a. Type B: 1" Insulated Glazing Unit (at interior storefront)
 - b. Type C: Not Used
 - c. Type D: Not Used
 - d. Type DL: 1/4" Laminated Float Glass
 - e. Type DT: Not Used
- B. Glazing at Doors, see door schedule.
 - 1. Type a: 1" Insulated Glazing Unit with Vitro Solarban 72 on Starphire glass, tempered
 - 2. Type b: 1/4" float tempered clear
- C. Mirrors: 1/4" Float Glass, ASTM C1048 Type 1, Class 1, Quality q2, silvering, electroplated copper coating, and protective organic coating. Applied to solid wall finish with mirror adhesive.
 - 1. Locations: restroom over lavatories, Fitness Room, and as indicated in drawings.
- D. Suffix T=Tempered.
- E. Manufacturers: Oldcastle Architectural Glass, PPG Industries, Guardian Industries.

2.6 ELASTOMERIC GLAZING SEALANTS

- A. Compatibility: Select glazing compounds and tapes of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
- B. Suitability: Comply with sealant and glass manufacturer's recommendations for selecting glazing sealants and tapes that are suitable for applications indicated and conditions existing at time of installation.
- C. Elastomeric Glazing Sealants: Comply with ASTM C920, Class A, and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates capable of water immersion without loss of properties; cured Shore A hardness of 15-25; color as selected.
 - 1. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Single-Component Neutral- and Basic-Curing Silicone Glazing Sealants:
 - a. Dow Corning Corporation; 999.
 - b. GE Silicones; SCS1200.
 - c. Tremco; Proglaze.

2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent, non-staining and non-migrating in contact with nonporous surfaces, with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated, packaged on rolls with a release paper backing, and complying with ASTM C1281 and AAMA 800 for products indicated below:
 - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.8 GLAZING GASKETS

- A. Dense Elastomeric Compression Seal Gaskets: Molded or extruded neoprene, EPDM, or silicone gaskets of profile and hardness required to maintain watertight seal; complying with ASTM C864, D.S. Brown Co., Maloney, Tremco or approved equal.
- B. Soft Compression Gaskets: Extruded or molded closed cell, integral-skinned neoprene, EPDM, or silicone of profile and hardness required to maintain watertight seal; complying with ASTM C509, Type II, black; D.S. Brown Co., Maloney, Tremco or approved equal.

2.9 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials involved for glazing application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
- C. Glazing Stops: Screw applied or snap on type (beads) coordinated with glass section indicated, finished to complement exterior window finish.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Mirror Mastic: Adhesive setting compound manufactured specifically for setting mirrors on wall with support channel at bottom edge.
 - 1. VOC Content: Not more than 70 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- F. Stainless Steel Mirror Trim: Continuous stainless steel J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch (9.5 and 22 mm) in height, respectively, and a thickness of not less than 0.04 inch (1.0 mm), fastened with stainless steel screws.

2.10 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Pre-Glazed Units: Fabricate glass and other glazing products in sizes required to preglaze units at the factory, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.
- B. Field-Glazed Units: Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

2.11 MIRROR FABRICATION

- A. Mirror Sizes: To suit Project conditions, and before tempering, cut mirrors to final sizes and shapes.
 - 1. Fabricate mirrors in single piece wherever possible.
 - 2. Where mirror length exceeds practical shipping and installation limits, follow seam pattern indicated on Drawings.
 - 3. Fabricate adjoining mirror units to be installed with hairline seams.
- B. Cutouts: Fabricate cutouts before tempering for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- C. Mirror Edge Treatment: Flat polished.
 - 1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
 - 2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 08 81 00

SECTION 08 91 00 – WALL LOUVERS

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 SECTION INCLUDES

- A. Fixed metal louvers and frames at exterior locations.
- B. Blank off panels.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axes of the blades are horizontal).
- C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.2, "Structural Welding Code--Aluminum."
 - 3. AWS D1.3, "Structural Welding Code - Sheet Steel."
 - 4. AWS D1.6, "Structural Welding Code - Stainless Steel."
- C. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver metal louvers so as not to be damaged or deformed. Package louvers for protection during transportation and handling.
- B. Store louvers vertically, covered with suitable weathertight and ventilated covering. Store louvers to ensure dryness, with positive slope for drainage of water. Do not store louvers in contact with other materials that might cause staining, denting, or other surface damage.

- C. Protect strippable protective covering on louvers from exposure to sunlight and high humidity, except to extent necessary for period of louver installation.

1.6 SITE CONDITIONS

- A. Field Measurements: Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 WARRANTY

- A. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials, fabrication or installation within specified warranty period. Warranty does not include normal weathering.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering in a marine environment.
 - 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- B. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Design earthquake spectral response acceleration, short period (Sds) for Project is indicated on Structural Drawings.
 - 2. Component Importance Factor: 1.5.
- C. Louver Performance ratings: Provide louvers complying with requirements specified as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
- E. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.2 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Continuous Blade Storm-Resistant Design: Factory welded assembly complete with extruded aluminum storm-resistant blades, bird screen, extruded aluminum sills, integral structural supports and blade braces.
 - 1. Blade Profile: Single, drainable.
 - 2. Frame and Blade Nominal Thickness: As required to comply with structural performance requirements, but not less than 0.081-inch (2.0 mm) for blades and frames.
 - 3. Material: Aluminum.
 - 4. Finish: Baked-enamel, color to match adjacent finish.
 - 5. Free Area Requirements: 50 percent net free area.
 - 6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
- B. Blank-off Panels: Manufacturer's standard insulated panels of same material and finish as louver.
 - 1. R-value of Blank-off Panels: Match R-value of adjacent wall construction.
- C. Gasketing: PVC compression gaskets, 1/2- by 1/2-inch, or 1/4-inch bead of silicone sealant.

2.3 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Bird screening.
- B. Secure screens to louver frames with stainless-steel machine screws, spaced a maximum of 6-inches (150 mm) from each corner and at 12-inches (300 mm) oc.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
 - 1. Metal: Same kind and form of metal as indicated for louver to which screens are attached.
 - 2. Finish: Mill finish, unless otherwise indicated.
 - 3. Type: Non-rewirable, U-shaped frames for permanently securing screen mesh.
- D. Louver Screening for Aluminum Louvers:
 - 1. Bird Screening: Aluminum, 1/2-inch- (12.7-mm-) square mesh, 0.063-inch (1.6-mm) wire.

2.4 MATERIALS

- A. Aluminum Extrusions: ASTM B221 6063-T5 alloy, extruded shape; ASTM B209 5005-H134 alloy, sheet; prefinished with shop applied Kynar 500 finish.
- B. Aluminum Sheet: ASTM B209, alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer to provide required finish.
- C. Fasteners: Of same basic metal and alloy as fastened metal or 300 Series stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined materials.
 - 1. Use types and sizes to suit unit installation conditions.

2. Use hex-head or Phillips pan-head screws for exposed fasteners, unless otherwise indicated.
 3. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 4. For color-finished louvers, use fasteners with heads that match color of louvers.
- D. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E488/E488M, conducted by a qualified independent testing agency.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- F. Flashings: Of same material as louver frame.
- G. Sealants: As recommended by louver manufacturer.

2.5 FABRICATION

- A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
1. Louver Frame: Channel shape, welded corner joints.
 2. Louver Panel Thickness: 6-inches deep.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Where indicated, provide subsills made of same material as louvers or extended sills for recessed louvers.
- F. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.
- G. Head and Sill Flashings: Roll formed or extruded to required shape, single length in one piece per location.

2.6 FINISHES, GENERAL

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

2.7 ALUMINUM FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
- C. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- D. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 08 91 00

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SECTION 09 22 16 – NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Non-load-bearing steel framing members for the following applications:
 - 1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
 - 2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).
 - 3. Resilient channel installation for acoustical construction.
 - 4. Flat strap and backing plate for support of wall mounted equipment and fixtures.

1.3 RELATED SECTIONS

- A. Section 05 40 00 - Cold-Formed Metal Framing: Exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.
- B. Section 09 22 19 – Cavity Shaft-Wall Assemblies: Non-load-bearing metal shaft-wall framing, gypsum panels, and other components of shaft-wall assemblies.
- C. Section 09 29 00 – Gypsum Board: Application of gypsum board over non-load bearing steel framing.

1.4 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Fire-Test-Response Characteristics: Provide components that comply with rating requirements specified for fire-rated assemblies under UL 2079 for non-load bearing wall systems.
 - 1. Deflection Clips and Firestop Track: Connections and/or top runner provided in fire-resistance-rated assemblies shall be certified by UL 2079 for cyclic movement requirements.
- C. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
- D. Structural supports and blocking for light fixtures and miscellaneous wall- or ceiling-mounted items shall be designed and engineered by Contractor.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Loads: Comply with CBC requirements for design of metal framing systems for gypsum board wall assemblies.
- B. Deflection:
 - 1. Partitions to Receive Gypsum Board: L/240 at 5 psf.
 - 2. Partitions at Elevator Shafts: L/240 maximum at 7.5 psf.
 - 3. Partitions to Receive Tile Backer Board: L/360 at 5 psf.
 - 4. Framed Ceilings: L/360. L/240 maximum, typical.
 - 5. Construction Supporting Masonry or Plaster: L/360 at 5 psf.
- C. Seismic Requirements: Comply with code requirements for seismic bracing.
- D. Gauges for metal framing: Provide required gauge for wall condition, depth and height.
- E. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:
 - 1. Light Gage Metal Framing: Minimum 28 percent total recycled content, and minimum 16 percent post-consumer recycled content.

2.2 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
 - 1. Steel Studs and Runners: Comply with ASTM C645 requirements for metal and profiles shown on Drawings, unless otherwise indicated.
 - 2. Protective Coating: ASTM A653/A653M, G60 (Z180) minimum, hot-dip galvanized zinc coating, unless otherwise indicated.
 - 3. Minimum Base-Metal Thickness: 0.0312 inch (0.79 mm).
 - a. If stud thickness is not indicated, provide thickness as required for specified deflection criteria, based on stud depth and spacing indicated and partition height required.
 - b. If stud spacing is not indicated, space studs at 16-inches oc.
 - 4. Flange Edges of Studs: Bent back 90 deg and doubled over to form 3/16-inch-wide minimum lip (return) and complying with the requirements indicated on Drawings for depth indicated.
- B. Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Slotted Slip Track: ASTM C645 top runner with 2-1/2-inch- (63.5-mm-) deep flanges in thickness not less than indicated for studs; with 1-1/2-inch x 1/4-inch vertical slots.
 - 2. Single Long-Leg Runner System: ASTM C645 top runner with 2-inch- (50.8-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
 - 3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure

above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

- C. Interior and Exterior Headers: ASTM A653/A653M and ASTM C645, where indicated.
1. Product: ClarkDietrich, ProSTUD Drywall Framing System, ProSTUD 25, or equal.
 - a. Strength: 25 Gauge: Grade 50 with a minimum yield point of 50,000 psi (345 MPa).
 - b. Minimum Thickness: 0.0150 inches (0.3810 mm).
 - c. Design Thickness: 0.0158 inches (0.4013 mm).
 2. Product: ClarkDietrich, ProSTUD Drywall Framing System, ProSTUD 20, or equal:
 - a. Strength: 20 Gauge: Grade 65 with a minimum yield point of 65,000 psi (448 MPa).
 - b. Minimum Thickness: 0.019 inches (0.4826 mm).
 - c. Design Thickness: 0.0200 inches (0.5080 mm).
 3. Width: As required for opening width indicated on Drawings.
 4. Finish: Galvanized, Class G90 in accordance with ASTM A1003 with coating weight in accordance with ASTM C645.
 5. Internal Clip: ProX Clip Series, or equal:
 - a. Thickness: 16 gauge (54 mils).
 - b. Width: As indicated on Drawings.
 6. Fasteners: Sheet metal screws in accordance with ASTM C954 or SAE J78:
 - a. Interior: No. 8 screws.
 - b. Exterior: No. 10 screws.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated and where required by City for City-installed items. Where backing is not indicated on Drawings comply with the following:
1. Minimum Base-Metal Thickness: 0.0312 inch (0.79 mm).
 2. Install continuous plate across minimum 3 studs, attaching to each stud.
 3. Notch channel at studs.
 4. For Loads Under 50 lbs/ft:
 - a. Plate Size: 6" x 1-1/4", 16 gage track channel.
 - b. Attachment: No. 8 flat head screws, three at each stud.
 5. For Loads 51 lbs/ft to 100 lbs/ft:
 - a. Plate Size: 6" x 1-1/4", 16 gage track channel.
 - b. Attachment: Welding.
 6. For Loads 101 lbs/ft to 250 lbs/ft:
 - a. Plate Size: 6-inch wide 14 gage plate with 4" x 1-1/4" 16 gage track channel stiffeners welded to back.
- E. Cold-Rolled Channel Bridging: 0.0538-inch (1.37-mm) bare-steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges.
1. Depth: 1-1/2 inches (38.1 mm) minimum, unless noted otherwise on Drawings.
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38.1 by 38.1 mm), 0.068-inch- (1.73-mm-) thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C645.
1. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm).
 2. Depth: 7/8 inch (22.2 mm).

- G. Resilient Furring Channels and Clips: 1/2-inch- (12.7-mm-) deep, steel sheet members designed to reduce sound transmission.

2.3 SUSPENSION SYSTEM COMPONENTS

- A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.0625-inch-(1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E488 by an independent testing agency.
 - a. Type: Postinstalled, expansion anchor.
 - 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E1190 by an independent testing agency.
- C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.162-inch (4.12-mm) diameter.
- D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch (1.37 mm) and minimum 1/2-inch- (12.7-mm-) wide flanges.
 - 1. Depth: 2 inches (51 mm).
- E. Furring Channels (Furring Members): As specified herein.
- F. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.
 - 1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include Armstrong World Industries, Inc.; Drywall Grid Systems, Chicago Metallic Corporation; 640 Drywall Ceiling Suspension, USG Corporation; Drywall Suspension System, or approved equal.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Shot Pins: 0.140-inch diameter low velocity powder-actuated drive pins equivalent to Ramset/Red Head No. 1508, or approved equal, with 7/8-inch minimum penetration into concrete.
- C. Isolation Strip at Exterior Walls: Provide the following:
 - 1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

- D. Acoustical Gasket at Window System/Framing Interface: ASTM D1065, Type 1, Class A; flexible cellular neoprene gasket.
- E. Acoustical Flute Closure: Flexible cellular neoprene closure shaped to fit underside of deck flutes at steel deck/head of framing interface.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
 - 1. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C1063 that apply to framing installation.
 - 2. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
 - 1. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with "Gypsum Construction Handbook" published by United States Gypsum Co.
- C. Backing Plates:
 - 1. Install as indicated and specified for support of wall-hung cabinets, toilet partitions and accessories, and other items to be mounted on vertical surfaces.
 - 2. Welding shall comply with AWS D1.3.
 - 3. Paint welds with a rust-inhibitive paint.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Headers: Install in accordance with ASTM C1007.
- G. Stud Wall Lateral Bracing: Comply with requirements of the 2019 CBC. Laterally brace walls extending above ceiling height by means of braces installed at not more than 45 degrees from horizontal as follows:
 - 1. 3-5/8 in x 25 gauge studs at 8 feet oc on each side of wall (in tension only).
 - 2. 12 gauge wire at 6 feet oc on each side of wall (in tension only).
 - 3. 3-5/8 inch x 1-1/4 inch x 16 gauge studs at 8 feet oc acting in either tension or compression. They may be on one side of wall only.
 - a. Maximum length is 7 feet when in compression.
 - b. For lengths from 7 to 10 feet (when in compression) form box studs built from two studs welded toe to toe for lengths from 10' to 16' (when in compression).
 - c. Form "T" sections of 4" x 1-5/8" x 18 gauge studs welded together.
 - 4. Attach stud braces at middle third of beams, purlins or joists.

END OF SECTION 09 2

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SECTION 09 22 19 – CAVITY SHAFT-WALL ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Steel shaft-wall framing and gypsum liner board for the following:
 - 1. Shaft enclosures.
 - 2. Chase enclosures.
 - 3. Stair enclosures.

1.3 RELATED SECTIONS

- A. Section 09 22 16 – Non-Structural Metal Framing.
- B. Section 09 29 00 - Gypsum Board: Application and finishing of gypsum board assemblies in other than shaft-wall assemblies.

1.4 DEFINITIONS

- A. Gypsum Board Construction Terminology: Refer to ASTM C11 for definitions of terms for gypsum board construction not defined in this Section or in other referenced standards.

1.5 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory." or GA-600, "Fire Resistance Design Manual".
- C. STC-Rated Assemblies: For gypsum board shaft-wall assemblies indicated to have STC ratings, provide assembly materials and construction complying with requirements of assemblies whose STC ratings were determined according to ASTM E90 and classified according to ASTM E413 by a qualified independent testing agency.

PART 2 - PRODUCTS

2.1 ASSEMBLY MATERIALS

- A. General: Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.

- B. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
- C. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.
- D. Steel Shaft Wall Framing: C-H studs, 20 gage minimum, as required for condition.
 - 1. Steel Sheet Components: Comply with ASTM C645 requirements for metal, unless otherwise indicated.
 - 2. Protective Coating: ASTM A653/A653M, G60 (Z180) minimum, hot-dip galvanized zinc coating, unless otherwise indicated.
- E. Gypsum Liner Panels: ASTM C442/C442M, manufacturer's proprietary Type X liner panels in 25.4-mm thickness and with moisture-resistant paper faces.
 - 1. Edges: Square.
 - 2. Size: 48- inches wide by lengths that will result in minimum footage of joints.
- F. Gypsum Wallboard: As specified in Section 09 29 00.
- G. Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Section 09 29 00 that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
- H. Gypsum Wallboard Joint-Treatment Materials: ASTM C475 and as specified in Section 09 29 00.
- I. Steel Drill Screws: ASTM C1002, unless otherwise indicated.
- J. Track (Runner) Fasteners: Powder-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
- K. Acoustical Sealant: As specified in Section 07 92 00.
- L. Sound Attenuation Blankets: See Section 07 21 00.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLING SHAFT-WALL ASSEMBLIES

- A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
 - 1. ASTM C754 for installing steel framing.
 - 2. Section 09 29 00 for applying and finishing panels.
 - 3. Section 0721 16 for installation of acoustical insulation.
- B. Do not bridge building expansion joints with shaft-wall assemblies; frame both sides of joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
- D. At elevator hoistway door frames, provide jamb struts on each side of door frame.
- E. Where handrails directly attach to gypsum board shaft-wall assemblies, provide galvanized steel reinforcing strip with 0.0312-inch (0.79-mm) minimum thickness of base (uncoated) metal, accurately positioned and secured behind at least 1 face-layer panel.
- F. Integrate stair hanger rods with gypsum board shaft-wall assemblies by locating cavity of assemblies where required to enclose rods.
- G. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- H. Isolate gypsum finish panels from building structure to prevent cracking of finish panels while maintaining continuity of fire-rated construction.
- I. Install control joints where indicated on Drawings to maintain fire-resistance rating of assemblies.
- J. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with manufacturer's written instructions or ASTM C919, whichever is more stringent.
 - 1. Leave a 1/8- to 1/4-inch space between gypsum wallboard and adjacent construction to provide a space for acoustical sealant.
 - 2. Seal airtight with acoustical sealant material specified in Section 07 92 00.
 - 3. Seal penetrations through walls, or cuts in one face of walls, with a full bead of sealant at perimeter; this includes provisions for electrical outlet and switch boxes, pipes, ducts and similar items.
 - 4. Install mild steel sleeves where required, fiberglass packing between sleeve or framing, service and cover plates. Seal on both sides to render airtight.

5. Tolerances: 1/8-inch between wall boarding and sleeve, 3/8- to 5/8-inch between sleeve and service
- K. In elevator shafts install a bead of acoustical sealant to prevent dislocation by air pressure differential.
1. Where gypsum board shaft-wall assemblies cannot be positioned within 2-inches (51 mm) of the shaft face of structural beams, floor edges, and similar projections into shaft, install 1/2- or 5/8-inch- (12.7- or 15.9-mm-) thick, gypsum board cants covering tops of projections.
 2. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24-inches (610 mm) oc with screws fastened to shaft-wall framing.
 3. Where steel framing is required to support gypsum board cants, install framing at 24-inches (610 mm) oc and extend studs from the projection to the shaft-wall framing.

END OF SECTION 09 22 19

SECTION 09 24 00 – PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Metal furring and lathing.
- B. Portland cement plaster systems of the following types:
 - 1. Exterior 3-coat system over metal stud framing.
 - 2.
 - 3. Exterior 2-coat system on CMU trash enclosure.
- C. Integral color acrylic plaster finish system.

1.3 RELATED SECTIONS

- A. Section 09 29 00 – Gypsum Board: Exterior sheathing substrate for cement plaster system.
- B. Section 09 91 00 – Painting.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with Northwest Wall and Ceiling Bureau's Stucco Resource Guide.
- B. Mockups: Before plastering, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Install mockups for each type of color and finish indicated.
 - 2. Demonstrate the proposed range of aesthetic effects, fabrication, and installation.
 - 3. In presence of Owner's representative, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of surface blemishes to match adjacent undamaged surfaces.

PART 2 - PRODUCTS

2.1 FIELD MIXED PLASTER MATERIALS

- A. Recycled Content: Provide products made from steel with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

- B. VOC Content: Adhesives, sealants, paints, welding, and coatings applied on-site on the interior of the building and products used on the interior of the building shall comply with VOC limits as specified in Section 01 25 55 CALGreen Environmental Requirements.
 - 1. Use materials that have the lowest possible VOC content in units of g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Base-Coat Cements: Type as indicated below:
 - 1. Portland cement, ASTM C150/C150M, Type I or II.
 - 2. Masonry cement, ASTM C91/C91M, Type N.
- D. Lime: ASTM C206, Type S or special hydrated lime for masonry purposes, ASTM C207, Type S.
- E. Sand Aggregate for Base Coats: Natural or manufactured sand, in accordance with ASTM C897.
- F. Alkali-Resistant Fiber Reinforcement: ASTM C1116/C1116M Type III 4.1.3, 100% virgin homopolymer micro-fibers; 1/2- to 3/4-inch long, free of contaminants, containing no reprocessed olefin materials, engineered and designed to be added to stucco scratch coat.
 - 1. Acceptable Manufacturers:
 - a. Fibercast 500 (formerly Harbourite), manufactured by SI Concrete Systems, (423) 892-8080 www.fibermesh.com.
 - b. Grace Micro Fiber manufactured by Grace Construction Products (877) 423-6491 www.graceconstruction.com.
 - c. Stucco-Bond manufactured by Forta Corp. (800) 245-0306 www.fortacorp.com.
- G. Acrylic-Based Finish Coatings: Pre-blended 100 percent acrylic polymer-based integral color and textured finish.
 - 1. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers producing premixed plaster products that may be incorporated into the Work include, but are not limited to, one of the following:
 - a. BMI Products.
 - b. Sto Corporation.
 - 2. Color Pigment: Mineral oxide type, color as selected; factory mixed by BMI or La Habra.
- H. Bonding Agent:
 - 1. Exterior Plaster: ASTM C932, resinous emulsion which will provide bond for gypsum or Portland cement, plaster, concrete, masonry, old or new surfaces
- I. Water: Clean, fresh, potable and free of mineral or organic matter that can affect plaster.

2.2 LATHING AND CONTROL JOINT MATERIALS

- A. Lath: ASTM C847, minimum 3.4 lb./sq yd self-furred galvanized steel diamond mesh metal lath.
 - 1. Galvanize metal lath in compliance with ASTM A653/A653M, G90, hot-dip galvanized zinc coating.

- B. Casing Bead: Formed sheet steel; minimum 25 gage thick; depth governed by plaster thickness; maximum possible lengths; expanded metal flanges, with square edges.
- C. Control Joint Accessories:
 - 1. Double-J Control Joint: Keene XJ15-3, CEMCO, or approved equal; one-piece, 25 gage galvanized steel, expanded 2-inch solid sheet metal flanges each side.
 - 2. Solid-Leg Control Joint: Keene #40, CEMCO, or approved equal, two-piece, 25 gage galvanized steel, 2-inch solid sheet metal flanges each side.
- D. Expanded Metal Strip Lath: ASTM C847 with ASTM A653/A653M, 60 (Z180), hot-dip galvanized zinc coating.
- E. Corner Mesh Reinforcement: Fabricated from metal lath with ASTM A653/A653M, G60 (Z180), hot-dip galvanized zinc coating.
- F. Anchorage Methods: Screws or other approved metal supports, of type and size to suit application, galvanized to rigidly secure lath and associated metal accessories in place.
- G. Install woven wire metal lath on sheathed stud walls using self furring fasteners.

2.3 CEMENT PLASTER MIXES – FIELD MIX

- A. General: Comply with ASTM C926 for applications indicated.
 - 1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. ft. (16 kg of fiber/cu. m) of cementitious materials. Reduce aggregate quantities accordingly to maintain workability.
- B. Base Coat and Brown Coat: One part plastic cement, 3-1/2 to 4 parts aggregate, 0.5% by weight plastic cement synthetic fibers, and 1/2 part (maximum) potable water.
- C. Mix only as much plaster as can be used prior to initial set.
- D. Mix materials dry, to uniform color and consistency, before adding water.
- E. Protect mixtures from freezing, frost, contamination, and evaporation.
- F. Do not retemper mixes after initial set has occurred.
- G. Do not use all plastic cement mixes.
- H. Exterior Joint Sealant: See Section 07 92 00.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
- B. Clean and remove surface projections, and apply bonding agent.

- C. Verify support framing is tied together at specified spacing with 16 gage wire.

3.2 INSTALLATION OF METAL LATH

- A. Install metal lath in accordance with ASTM C1063.
 - 1. Partition Framing and Vertical Furring: Install flat diamond-mesh lath.
 - 2. Flat-Ceiling and Horizontal Framing: Install 3/8-inch (9.5-mm) rib lath.
 - 3. Curved-Ceiling Framing: Install welded-wire lath.
 - 4. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.
- B. Apply metal lath taut, with long dimension perpendicular to supports. Secure side laps with tie wire where they occur between supports. Lap ends and sides.
 - 1. Lap ends of lath minimum 1-inch in accordance with ASTM C933. Where end laps occur between supports provide additional framing support in order to anchor lath to structure, and secure with tie wire.
 - 2. Lap sides of lath 1/2-inch minimum.
 - 3. Run lath continuously at internal corners or terminate with casing bead.
 - 4. Secure self-furred type lath to framing at furring points as much as possible.
 - 5. Fasteners: Spaced maximum 6-inches oc. All ceiling lath to be wire-tied to 3/4-inch cold rolled channels. Screw attachment of overhead lath will not be permitted.
- C. Discontinue lath at all control joint and expansion joint locations. Fully back the discontinued sheets of lath at these locations with blocking for edge fasteners; ensure control joints are located over studs or sheet metal backer plates.
 - 1. Embed end of control joints in sealant during installation.
- D. Attach metal lath to metal supports using 18-gage tie wire at maximum 6 inches oc.

3.3 INSTALLING ACCESSORIES

- A. Install according to ASTM C1063 and at locations indicated on Drawings.
- B. General: Anchor cement plaster accessories through the sheathing to the stud supports using appropriate fasteners.
- C. Reinforcement for External Corners:
 - 1. Install lath-type, external-corner reinforcement at exterior locations.
 - 2. Install cornerbead at interior locations.
- D. Control Joints: Install control joints at locations indicated on Drawings. Where not indicated comply with the following:
 - 1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft. (13.4 sq. m).
 - b. Horizontal and other Nonvertical Surfaces: 100 sq. ft. (9.3 sq. m).
 - 2. At distances between control joints of not greater than 18 feet (5.5 m) oc.
 - 3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
 - 4. Where control joints occur in surface of construction directly behind plaster.

5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.
- E. Place 6" x 18" strip lath diagonally at corners of lathed openings and 12" around penetrations such as lighting fixtures. Secure rigidly in place.
- F. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches from corner to the angle reinforcement; fasten at perimeter edges only.
- G. Place Corneraid at corners; fasten at outer edges only.
- H. Place casing beads at terminations of plaster finish. Stop ends 1/4 inch away from top of wall. Caulk with silicone sealant.
- I. Reinforce interior angles and flat joints with joint tape and embedding material recommended by manufacturer.
- J. Position the layering of sheet membrane products and self-adhesive flashings so that plaster does not come in direct contact with self-adhesive flashing at horizontal locations including floor lines, reveals and sills.

3.4 PLASTER APPLICATION

- A. Inspect building paper, after lath and accessory installation and before plastering, to identify and repair open holes, tears or other water intrusion pathways.
- B. General: Comply with ASTM C926 and manufacturer's instructions.
 1. Do not deviate more than plus or minus 1/4 inch in 10 feet (6.4 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed on surface.
 2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
- C. Bonding Compound: Apply on solid flanges of metal accessories, and plaster bases.
- D. Do not install stucco during extremely hot, dry, or windy conditions. Do not install stucco during freezing conditions or on frozen substrates.
- E. Mechanically mix cementitious and aggregate materials for plasters to comply with recommendations of plaster manufacturer.
- F. Vertical Framed and Sheathed Surfaces: Apply scratch coat to a nominal thickness of 3/8 inch over metal lath, brown coat to a nominal thickness of 3/8 inch.
 1. When scratch coat is firm, score in one direction.
 2. Apply scoring in brown coat to adequately key finish coat into base and as required to achieve required finished texture in approved mockup.

- G. Concealed Exterior Plasterwork: Where plaster application will be used as a base for adhered finishes, omit finish coat.
- H. Apply the stucco in discrete panels without interruption to avoid cold joints and differences in appearance.
- I. Abut wet stucco to set stucco at natural or architectural breaks in the wall such as expansion joints, pilasters, terminations, or changes in plane.
- J. Do not install stucco onto grounds of accessories.
- K. Completely embed lath and flanges of accessories and completely cover attachments with stucco.
- L. Curing: Use fine fog spraying for curing operations.
 - 1. After 48 hours, review with plastering superintendent to determine need for any further moist curing.

3.5 CUTTING AND PATCHING

- A. Cut, patch, replace, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections.
- B. Repair or replace work to eliminate blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed. Match adjacent finish texture so no evidence of patching is visible.
- C. Upon completion of application, point up plaster around trim and other locations where plaster meets dissimilar materials.

END OF SECTION 09 24 00

SECTION 09 29 00 – GYPSUM BOARD

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 SECTION INCLUDES

- A. Gypsum wallboard, rated and non-rated.
- B. Ceramic tile backing wallboard.
- C. Gypsum board trims and accessories.

1.3 RELATED SECTIONS

- A. Section 05 40 00 - Cold-Formed Metal Framing: Load-bearing steel framing.
- B. Section 07 84 00 – Firestopping.
- C. Section 07 92 00 - Joint Sealants: Acoustical sealant.
- D. Section 09 22 16 – Non-Structural Metal Framing.
- E. Section 09 22 19 - Cavity Shaft-Wall Assemblies: Non-load-bearing metal shaft-wall framing, gypsum panels, and other components of shaft-wall assemblies.

1.4 DEFINITIONS

- A. Gypsum Board Construction Terminology: Refer to ASTM C11 and GA-505 for definitions of terms related to gypsum board assemblies not defined in this Section or in other referenced standards.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For gypsum board with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. STC- Rated assemblies: For STC rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.6 SITE CONDITIONS

- A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C840 and with gypsum board manufacturer's recommendations.
- B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F (4 deg C). For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F (10 deg C) for 48 hours prior to application and continuously after until dry. Do not exceed 95 deg F (35 deg C) when using temporary heat sources.
- C. Ventilation: Ventilate building spaces, as required, for drying joint treatment materials. Avoid drafts during hot dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD PRODUCTS

- A. General: Provide gypsum board of types indicated in maximum lengths available to minimize end-to-end butt joints.
- B. Recycled Content: Provide gypsum board products with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 50 percent.
- C. VOC Content: Adhesives and sealants applied on-site on the interior of the building and products used on the interior of the building shall comply with VOC limits as specified in Section 01 8113 - Sustainable Design Requirements.
 - 1. Use materials that have the lowest possible VOC content in units of g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C840:
 - 1. Level 0: In areas of temporary construction, no taping or accessories are required.
 - 2. Level 1: Ceiling plenum areas and concealed areas. Provide higher level of finish as required to comply with fire-resistance ratings and acoustical ratings.
 - 3. Level 2: Gypsum board substrate at tile, except remove tool marks and ridges.
 - 4. Level 3: Gypsum board surfaces, where textured finishes will be used.

5. Level 4: Gypsum board surfaces, except where another finish level is specified.
 6. Level 5: Gypsum board surfaces in Lobby and feature walls.
- E. Interior Gypsum Wallboard: ASTM C1396/C1396M except where noted otherwise:
1. Fire-Rated Gypsum Board: ASTM C1396/C1396M; Type X where required for fire-resistive-rated assemblies.
 2. Gypsum Ceiling Board: ASTM C1396/C1396M; High-strength, sag-resistant type for ceiling surfaces.
 3. Long Edges: Tapered.
 4. Thickness: ASTM C840, 5/8-inch throughout unless indicated otherwise on Drawings.
- F. Interior Mold-Resistant Fiber Board: ASTM C1396/C1396M; with cores and surfaces manufactured to produce greater resistance to mold and moisture than standard gypsum panels.
1. Core: 5/8-inch Fiberock Brand Aqua-Tough by USG Corporation, XP Wallboard by National Gypsum Co., or AirRenew by CertainTeed.
 2. Long Edges: Tapered.
 3. Mold Resistance: ASTM D3273, score of 10.
- G. Exterior Gypsum Sheathing: ASTM C1177/C1177M, Georgia-Pacific, Dens-Glass Gold Exterior Sheathing, 5/8-inch- (15.8-mm-) thick water-resistant treated gypsum core board with inorganic glass mats both sides and long edges, gold color alkali resistant surface coating, for exterior applications.

2.2 TILE BACKING PANELS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Interior Water-Resistant Gypsum Backing Board: ASTM C1178/C1178M.
1. Manufacturer: Georgia Pacific; DensShield Tile Backer.
 2. Core: 5/8 inch (15.9 mm), Type X.
 3. Mold Resistance: ASTM D3273, score of 10.
 4. Locations: At Toilet wet walls; maximum framing at 16-inches oc.
- C. Exterior Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A, in maximum lengths available to minimize end-to-end butt joints.
1. Thickness: 5/8-inch.
 2. Width: Manufacturer's standard width, but not less than 32 inches.
 3. Accessories: include interior tape, reinforcing mesh, trim and bead.
 4. Locations: At exterior walls.

2.3 TRIM ACCESSORIES

- A. Accessories for Interior Installation: Corner beads, edge trim, and control joints complying with ASTM C1047.
1. Material: Formed metal or metal combined with paper, with metal sheet steel zinc-coated by hot-dip or electrolytic processes, or with aluminum or rolled zinc.
- B. Square Corner Bead Reinforcement: One of the following :

1. Dur-A-Bead as manufactured by USG or equal.
 2. Wallboard corner bead with 1 1/4-inch flanges as manufactured Gold Bond Building Products Div., National Gypsum Co. or equal.
- C. Metal Casing Bead: One of the following :
1. No. 200A Metal Trim manufactured by USG or equal.
 2. No. 100 wall board casing manufactured by Gold Bond National Gypsum Company, or equal.
- D. Control Joints: One of the following :
1. No. 093; as manufactured by USG or equal.
 2. E-Z expansion joint 0.093 zinc control joint, manufactured by Gold Bond National Gypsum Company, or equal.

2.4 JOINT TREATMENT MATERIALS

- A. General: Provide joint treatment materials complying with ASTM C475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
- B. Joint Tape for Gypsum Board: ASTM C475 and as follows:
1. Interior Gypsum Board: Paper reinforcing tape, one grade for bedding tapes and filling depressions, and one for topping and sanding, unless otherwise indicated.
 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
- C. Setting-Type Joint Compounds for Gypsum Board:
1. Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.
 2. Where setting-type joint compounds are indicated as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
- D. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by the gypsum board manufacturer for this purpose.
- E. For topping compound, use sandable formulation.
- F. Drying-Type Joint Compounds for Interior Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.
1. Ready-Mixed Formulation: Factory-mixed product.
 2. All-purpose compound formulated for both taping and topping compounds.

2.5 AUXILIARY MATERIALS

- A. Spot Grout: ASTM C475, setting-type joint compound recommended for spot grouting hollow metal door frames.
- B. Fastening Adhesive for Metal: Special adhesive recommended for laminating gypsum panels to steel framing.

1. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Multipurpose Construction Adhesives: 70 g/L.
- C. Steel Drill Screws: ASTM C1002, unless otherwise indicated.
 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 - a. Gold Bond, Type-S, 1-inch drywall screws U.S. Gypsum Type-S, panhead, 1-inch, or approved equal.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Other Fasteners: As required and recommended by gypsum wallboard manufacturer and in accordance with the specified Standards. Space fasteners in accordance with 2016 CBC Table 47 G and 47 H.
- E. Acoustical Accessories:
 1. Acoustic Insulation: See Section 07 2100.
 2. Acoustical Sealant: See Section 07 9200.
 3. Rated Acoustical Sealant: See Section 07 9200.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

- A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C840 and GA-216.
- B. Install control joints at locations indicated on Drawings, or if not indicated, install according to ASTM C840 in specific locations as directed by Architect and Owner.
- C. Place control joints to be consistent with lines of building spaces.
 1. Provide where system abuts structural elements.
 2. Provide at dissimilar materials.
 3. Provide where lengths in partitions exceed 30'-0".
- D. Installation of Fasteners Non-Fire-Rated Partitions: Install fasteners in accordance with GA-216 and ASTM C840.

3.2 FINISHING GYPSUM BOARD ASSEMBLIES

- A. Interior Gypsum Board Finishing:
 1. Corners: Square.
 2. Taping (Level 1):
 - a. Use taping or all-purpose compound.
 - b. Butter taping compound into inside corners and joints.
 - c. Center tape over joints and press down into fresh compound.
 - d. Remove excess compound. Tape joints of gypsum board above suspended ceilings.

3. First Coat (Level 2):
 - a. Use taping or all-purpose drying-type compound or setting-type joint compound.
 - b. Immediately after bedding tape, apply skim coat of compound over body of tape and allow to dry completely in accordance with manufacturer's instructions.
 - c. Apply first coat of compound over flanges of trim and accessories, and over exposed fastener heads and finish level with board surface.
4. Second Coat (Level 3):
 - a. Use all purpose or topping drying type joint compound.
 - b. After first coat treatments is dried, apply second coat of compound over tape and trim, feathering compound 2-inches beyond edge of first coat.
5. Third Coat (Level 4):
 - a. Use all purpose or topping drying type joint compound.
 - b. After second coat has dried, sand surface lightly and apply thin finish coat to joints, fasteners and trim, feathering compound 2-inches beyond edge of second coat.
 - c. Allow third coat to dry. Apply additional compound, and touch-up and sand, to provide surface free of visual defects, tool marks, and ridges, ready for application of finish.
6. Skim Coat (Level 5):
 - a. Apply skim coat of all-purpose drying-type compound over exposed surfaces of gypsum board.
 - b. After skim coat has dried, touch-up and sand to provide surface free of visual defects, tool marks, and ridges, and ready for application of finish.

3.3 INSTALLATION OF EXTERIOR GYPSUM SHEATHING

- A. Comply with GA-253 and manufacturer's written instructions.

END OF SECTION 09 29 00

SECTION 09 30 00 – TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Porcelain tile flooring
- B. Porcelain tile wall finish.
- C. Epoxy grout at Restrooms.
- D. Metal edge transition strips.
- E. Solid surface or marble thresholds
- F. Underlayment for tile floors over wood substrate.
- G. Special floor flatness performance requirements for large format tile floors.

1.3 RELATED SECTIONS

- A. Section 07 92 00 - Joint Sealers: Sealing of expansion, contraction, control, and isolation joints in tile surfaces.
- B. Section 09 29 00 - Gypsum Board: Gypsum backing board and cementitious backing board installed as part of gypsum wallboard systems for use under tile installations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Deliver extra materials to Owner. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.5 QUALITY ASSURANCE

- A. Installer's Qualifications: A minimum of 3-years' experience installing ceramic tile of the types specified, and a minimum of 5 installations of a magnitude similar to or larger than the work of this Section.
- B. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, and variety of tile from a single source with resources to provide products of consistent quality in appearance without delaying progress of the work.

- C. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Floor tile shall have a minimum dry coefficient of friction (DCOF) of 0.42 determined in accordance with ANSI A137.1 DCOF AcuTest.
- B. Floor Surface Profile, ASTM E1155:
 - 1. Floor Flatness Number (FF): 50 (1/8" in 10'-0").
 - 2. Floor Levelness Number (FL): 35.
- C. Confirm flatness requirements within 72 hours of finishing the slab.

2.2 TILE PRODUCTS

- A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.
- B. Shapes and Trim: Selected from manufacturer's standard shapes and trim units:
 - 1. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:
 - a. Size: As indicated on Drawings, coordinated with sizes and coursing of adjoining flat tile where applicable.
 - b. Base: Coved.
 - 1) Color: Match floor tile.
 - c. Wainscot Cap: Bullnose cap.
 - 1) Color: Match wall tile.
 - d. Internal Corners: Field-buttet square corners, except use coved base and cap angle pieces designed to member with stretcher shapes.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages.
- D. Mounting: for factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

2.3 SETTING MATERIALS

- A. Medium-Bed, Latex-Portland Cement Mortar: Comply with requirements in ANSI A118.04 and ANSI A118.15. Provide Type S mortar that is approved by manufacturer for application thickness of minimum 1/2-inch to maximum of 1-1/4-inches.
 - 1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.

- B. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3.
 - 1. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F (60 and 100 deg C), respectively, and certified by manufacturer for intended use.
 - 2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.
 - 3. Color: To be selected from manufacturer's full range.
- C. Water: Clean, potable.

2.4 GROUTING MATERIALS

- A. Latex-Portland Cement Grout: ANSI A118.6, Portland cement, latex additive, and water; latex- Portland cement type; un-sanded.
 - 1. Latex additive (water emulsion) serving as replacement for part or all of gaging water, added at job site with dry grout mixture, with type of latex and dry grout mix as follows:
 - 2. Latex Type: Manufacturer's standard.
 - 3. Color: As indicated on Drawings.
- B. Color Admixture: Cementitious type, color as specified from manufacturer's full color range including premium colors.
- C. Application: Use commercial Portland cement grout combined with latex additive for grouting joints in floor tile unless otherwise indicated.

2.5 MISCELLANEOUS MATERIALS

- A. Foot Traffic Floor Transitions:
 - 1. Description: Metal profiles designed to provide a smooth transition between tile coverings and flooring or finished concrete at lower elevations.
 - 2. Product: Provide "Schluter-RENO-U" manufactured by Schluter Systems, or equal, stainless steel.
- B. Edge Strips:
 - 1. Description: L-shaped profile with 1/8-inch wide visible surface and integrated trapezoid-perforated anchoring leg and grout joint spacer.
 - 2. Product: Provide "Schluter-SCHIENE" or "Schluter-JOLLY" manufactured by Schluter Systems, or equal, stainless steel.
- C. Outside Corner Edge Protection:
 - 1. Description: Stainless steel edging profile for 90- or 135-degree outside corners of tiled walls.
 - 2. Product: Provide "Schluter-ECK-E" manufactured by Schluter Systems, or equal, stainless steel.
- D. Thresholds: Solid surfacing material fabricated to sizes and profiles indicated or required to provide transition between adjacent floor finishes
 - 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of

- threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
2. ASTM C503, with a minimum abrasion resistance of 12 per ASTM C1353 or ASTM C241 and with honed finish; color to coordinate with floor tile.
 - a. Size: 1/2 inch high by width of jamb by full width of wall or frame opening.
 - b. Edges: Beveled one side as indicated on Drawings, radiused edges from bevel to vertical face.
 3. Finish: As selected by Architect and Owner.
- E. Ceramic Tile Backing Panels: See Section 09 29 00.
- F. Metal Edge Strips: Schluter Systems, or approved equal.
- G. Protective Grout Sealer: Manufacturer's heavy-duty product for sealing grout joints and that does not change color or appearance of grout as manufactured by Custom Building Products, Bostik, Hydrament, Laticrete, or Mapei.

2.6 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

2.7 WATERPROOFING AND UNDERLAYMENT FOR TILE INSTALLATIONS

- A. Waterproofing:
 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
 - a. Laticrete International, Inc., 'Hydro Ban'.
- B. Self-Leveling Underlayment: Provide where concrete floor substrate does not meeting specified flatness criteria.
 1. Basis-of-Design: Mapei, Ultraplan Easy, or equivalent that is compatible with tile setting mortar.

PART 3 - EXECUTION

3.1 EXAMINATION

3.2 PREPARATION

- A. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 WATERPROOFING INSTALLATION

- A. Pre-Treat Drains: Drains must be of the clamping ring type, with weepers and meeting ASME A112.6.3 requirements.
 - 1. Cut a square of reinforcing fabric approximately 38" x 38" (965 mm x 965 mm). In the center of the reinforcing fabric square, cut a hole that matches the diameter of the drain throat as closely as possible.
 - 2. Apply a liberal coat of liquid around and over the bottom half of the drain-clamping ring. Center the circular cutout over the drain throat and embed the reinforcing fabric square into the liquid.
 - 3. If 38" (965 mm) wide reinforcing fabric is not available, embed pieces of 6" (150 mm) wide fabric into the liquid, encircling the drain throat as closely as possible.
 - 4. Cover with a second liberal coat of liquid. When dry, apply manufacturer's recommended waterproof sealant bead where the reinforcing square cutout meets the drain throat.
 - 5. Install top half of drain clamping ring.
- B. Flood Testing: Allow membrane to cure fully before flood testing, typically 7 days at 70°F (21°C) and 50% RH. Cold and/or wet conditions will require a longer curing time.

3.4 INSTALLATION, GENERAL

- A. TCNA Installation Guidelines: TCNA "Handbook for Ceramic Tile Installation"; comply with TCNA installation methods indicated.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.
- D. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.
- E. Lay out tile wainscots to next full tile beyond dimensions indicated.
- F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.
- G. Locate joints in tile surfaces directly above joints in concrete substrates.

3.5 INSTALLATION SCHEDULE

- A. General: Install tile according to most current edition of the TCNA Handbook using method numbers as indicated below.
- B. Floor Tile over Concrete Floor: TCNA Handbook, No. F113.

- C. Floor Tile Thin-Set over Waterproof Membrane: TCNA Handbook, No. F122.
- D. Floor Tile over Wood Subfloor: TCNA Handbook, No. F144.
- E. Floor Tile over Cementitious Self-Leveling Underlayment: TCNA Handbook, No. F185.
- F. Floor Tile Thin-set over Concrete Slab with Epoxy Grout: TCNA Handbook, No. F115.
- G. Wall Tile over Metal Studs and Gypsum Wallboard: TCNA Handbook, No. W243.
- H. Thresholds: TCNA Handbook, No. TR611.
- I. Expansion Joints: TCNA Handbook, No. EJ171.
 - 1. Exterior: Provide expansion joints at 12- to 16-feet on center in both directions, over cold joints and saw-cut control joints, and where tile abuts restraining surfaces. Joint width shall be minimum 3/8-inch wide for joints spaced 12-feet on center and 1/2-inch wide for joints spaced 16-feet on center.
 - 2. Interior: Provide expansion joints at 24- to 36-feet on center in both directions, over cold joints and saw-cut control joints, and where tile abuts restraining surfaces. Joint spacing for tile exposed to direct sunlight or moisture shall be 12-to 16-feet on center. Joint width for paver tile shall be minimum 1/4-inch wide; ceramic mosaic tile and glazed wall tile shall be minimum 1/8-inch.
 - 3. Sealant Materials: As specified in Section 07 92 00.

END OF SECTION 09 30 00



SECTION 09 51 23 – ACOUSTICAL TILE CEILINGS

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 SECTION INCLUDES

- A. Acoustical panels and exposed suspension systems for ceilings of the following types:
 - 1. Standard ceiling tile system.
 - 2. Large format ceiling tile system.
 - 3. Scrubbable ceiling tile system.
- B. Suspended metal grid ceiling system and perimeter trim.

1.3 RELATED SECTIONS

- A. Section 09 29 00 – Gypsum Board: Suspended gypsum board ceilings.
- B. Section 09 54 23 - Linear Plank Metal Ceilings.
- C. Division 21: Sprinkler heads in acoustical ceilings.
- D. Division 23: Grilles, registers, and diffusers in acoustical ceilings.
- E. Division 26: Lighting fixtures in acoustical ceilings.

1.4 QUALITY ASSURANCE

- A. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory with the experience and capability to conduct the testing indicated, as documented according to ASTM E48. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.
- B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 - 1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.

- b. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 2. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E1264 for Class A materials as determined by testing identical products per ASTM E84:
 - a. Smoke-Developed Index: 450 or less.
- D. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 - 1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E580/E580M.
 - 2. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Provide linear metal ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 - 1. 2013 CBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."
- B. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- C. VOC Content: Sealants applied on-site on the interior of the building and products used on the interior of the building shall comply with VOC limits as specified in Section 018113 - Sustainable Design Requirements.
 - 1. Use materials that have the minimum VOC content in units of g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.2 CEILING TILES

- A. Source Limitations: Obtain each type from single source from single manufacturer
- B. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration and size indicated on drawings that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings and light reflectance unless otherwise indicated.
 - 1. Mounting method for measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 975.
- C. Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical tiles are indicated by referencing pattern designations in ASTM E 1264 and not manufacturer's proprietary product designations, provide products from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail and size to the City for review.

- D. Ceiling Tile (ACT-1):
 - 1. Size: 24 by 48-inches.
 - 2. Thickness: 1 inches
 - 3. Composition: Wet-formed mineral fiber.
 - 4. Acoustics NRC: 0.95.
 - 5. CAC: NA.
 - 6. Edge: Square tegular.
 - 7. Surface Color: White.
 - 8. Surface Finish: Factory-applied latex paint.
 - 9. Grid Width: 9/16-inch

- E. Ceiling Tile (ACT-2):
 - 1. Size: 24 by 48-inches.
 - 2. Composition: Ceramic and mineral fiber composite, water repellent, washable tile for “Kitchen Zone”.
 - 3. Acoustics NRC: N/A.
 - 4. CAC: 40.
 - 5. Edge: Tegular
 - 6. Surface Color: White.
 - 7. Surface Finish: Scrubbable, factory-applied plastic.
 - 8. Grid Width: 9/16-inch.

2.3 SUSPENSION SYSTEM COMPONENTS

- A. Source Limitations: Obtain each type from single source from single manufacturer

- B. Suspension System: ASTM C635/C635M, Armstrong World Industries, Inc.,
 - 1. Standard Grid:
 - a. Armstrong World Industries, Inc., Prelude XL Exposed Tee, USG DXL, or accepted equal compatible with selected ceiling tile.
 - b. Exposed Grid Surface Width: 9/16-inch.
 - c. Finish: White, low gloss baked enamel finish, color to match ceiling tiles exactly.
 - d. Main Runners: 15/16-inch flange, 1-11/16-inch high, double web construction.
 - e. Cross Runners: 15/16-inch flange, double web construction.
 - f. Wall Angle, Reveals, and Miscellaneous Trim: Roll-formed from electro-galvanized steel strip to profiles indicated.
 - 2. Seismic Category: See structural documents.
 - 3. Finish: White, low gloss baked enamel finish, color to match ceiling tiles exactly.
 - 4. Wall Angle, Reveals, and Miscellaneous Trim: Roll-formed from electro-galvanized steel strip to match main runners and cross tees.

- C. Attachment Devices: Size for 5 times design load indicated in ASTM C635/C635M, Table 1, Direct Hung, double web, Intermediate-Duty System, unless otherwise indicated.

- D. Wire for Hangers and Ties: ASTM A641/A641M, Class 1 zinc coating, soft temper.
 - 1. Gage: Provide wire sized so that stress at 3 times hanger design load (ASTM C635/C635M, Table 1, Direct-Hung) will be less than yield stress of wire, but provide not less than 0.106-inch diameter (12-gage).

- E. Support Hangers and Channels: Mild steel, zinc coated, or protected with rust-inhibitive paint, size and shape to suit application and seismic requirements.
 - 1. Hanger Wires: Connection device capable of carrying not less than 100-pounds.
 - 2. Bracing Wires: Connection device capable of carrying not less than 200-pounds or the actual design load, whichever is greater, with a safety factor of 2 without yielding.
- F. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
 - 1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
- G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- H. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical tiles in-place.

2.4 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
 - 1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
 - 2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
 - 3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.5 ACOUSTICAL SEALANT

- A. Acceptable Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.
 - 2. Acoustical Sealant for Concealed Joints:
 - a. OSI Sealants, Inc.; Pro-Series SC-175 Rubber Base Sound Sealant.
 - b. Pecora Corporation; BA-98.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.

- B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
- C. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 09 51 23

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SECTION 09 54 23 – LINEAR PLANK METAL CEILINGS (EXTERIOR)

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 SECTION INCLUDES

- A. Strip, decorative, wood-look aluminum linear metal pans and suspension systems for exterior soffits
- B. Accessories; provide other necessary items including devices for attachment overhead construction, secondary members, splines, splices, connecting clips, wall connectors, wall angles, and other devices required for a complete installation.
- C. Supplemental support framing: Provide fully engineered secondary framing as required to meet code, conforming to layout shown in drawings, to support direct-hung metal ceilings suspension system.

1.3 RELATED SECTIONS

- A. Section 05 40 00 – Cold-Formed Metal Framing
- B. Section 09 29 00 – Gypsum Board: Suspended gypsum board ceilings.
- C. Divisions 21, 23, and 26 Sections for sprinklers, air-distribution components, and light fixtures.

1.4 QUALIFICATION DATA:

- A. Test Reports: Certified reports from independent agency substantiating structural compliance to windloads and other governing requirements.
- B. Certificates:
 - 1. Data substantiating manufacturer and installer qualifications.
 - 2. Certified data attesting fire rated materials comply with specifications.
- C. Manufacturer's Instructions: Detailed installation instructions and maintenance data.

1.5 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. E 84 – “Standard Test Method for Surface Burning Characteristics of Building Materials”
 - 2. E 488 – “Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements”

3. B 209 – “Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate”
4. C 423 – “Sound Absorption and Sound Absorption Coefficients by Reverberation Room Method”
5. E 580 – “Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint”
6. C 635 – “Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings”
7. C 636 – “Recommended Practice for Installation of Metal Ceiling Suspensions Systems for Acoustical and Lay-in Panels”
8. A 641 – “Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire”
9. A 653 – “Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip process”
10. E 1264 – “Classification for Acoustical Ceiling Products”
11. E 1477 – “Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by use of Integrating-Sphere Reflectometers”
12. D 1044 – “Practice for Abrasion Resistance”
13. D 1002 – “Practice for Adhesion Resistance”

1.6 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.

1.7 COORDINATION

- A. Coordinate layout and installation of linear metal pans and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.8 QUALITY ASSURANCE

- A. Manufacturer/Installer Qualifications:
 1. Provide metal ceiling system components produced by a single manufacturer with a minimum 10 years’ experience in actual production of specified products and with resources to provide consistent quality in appearance and physical properties, including production in an environmentally controlled indoor factory facility and having previously certified Miami-Dade County NOA certifications.
 2. Provide suspension system components produced by a single manufacturer to provide compatible components for a complete metal ceiling system installation.
 3. Perform installations using a firm with installers having no less than 3 years of successful experience on projects of similar size and requirements.
- B. Regulatory Requirements:
 1. Fire Rating Performance Characteristics: Install system to provide a flame spread of 0 - 25, complying with certified testing to ASTM E 84.
 2. Structural Criteria: Install and certify system to comply with structural and wind load requirements of governing codes.
 3. Installation Standard for Suspension System: Comply with ASTM C 636.
 4. Wind Load: Per code. Designed and tested in accordance with the requirements of the Florida Building Code 7th edition (2020), including the High Velocity Hurricane

Zone (HVHZ) provisions and Miami-Dade requirements. Miami-Dade County, Florida Notice of Acceptance No. 21-0308.02 (expires 5/5/2026).

- C. Source Limitations: Obtain each set of linear metal pans and suspension systems from one source with resources to provide products of consistent quality in appearance, physical properties, and performance.
- D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver linear metal pans, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

1.10 SITE CONDITIONS

- A. Environmental Limitations: Do not install linear metal ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Provide linear metal ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 - 1. CBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."

2.2 MANUFACTURER

- A. Basis-of-Design Product: Certaineed/Hunter Douglas 300C Linear plank metal ceiling system with universal carriers.

2.3 SYSTEMS MATERIALS

- A. Linear metal plank ceiling system for exterior installations
- B. Panel Profile Type: roll formed .028" thick aluminum; 11.811" (300 mm) wide, fabricated to provide a beveled edge joint between panels when installed.
- C. Panel Finish:
 - 1. Decorated Wood-Look Powder Coat for Library, Teen Center, and Community Hall Pavilion soffits; Basis of Design Color: Certaineed "8422 Fonthill Cherry"

2. Powder Coat for covered walkway soffit; Architect to select from manufacturer's full range of premium custom colors

D. Suspension System (Concealed)

1. Metal Suspension Systems Standard: Provide ceiling manufacturer's standard metal suspension systems of types and finishes indicated that comply with applicable ASTM C635/C635M requirements. Provide systems complete with carriers, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, fixture adapters, and other suspension components required to support ceiling units and other ceiling-supported construction. Include:
 - a. Carrier: Formed, inverted V-shaped, 0.95 mm (0.040") thick roll-formed aluminum, by 62 mm (2.45") high carrier sections. Carrier cross sections receiving ceiling panels pre-punched with prongs for snap attachment and support of panel side edges, factory finished with matte-black baked finish.
 - b. Provide manufacturer's standard metal carrier suspension system components, including splices, connector wire clips, hanger rods and adjustment springs, PVC closing pieces and trim for panel end attachment to wall.
 - c. Attachment Devices: Size for 5 times the design load indicated in ASTM C635/C635M, Table 1, Direct Hung, unless otherwise indicated.
 - d. Post-installed Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E488/E488M or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency.
 - 1) Type: Post-installed expansion anchors.
 - 2) Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B633, Class Fe/Zn 5 (0.005 mm) for Class SC service condition (mild).
 - e. Wire Hangers, Braces, and Ties: Provide wire complying with the following requirements:
 - 1) Zinc-Coated Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
 - 2) Size: Select wire diameter so its stress at 3 times the hanger design load (ASTM C635/C635M, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.
 - f. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
 - g. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
 - h. Stabilizer Channels, Tees, and Bars: Manufacturer's standard components for stabilizing main carriers at regular intervals and at light fixtures, air-distribution equipment, access doors, and other equipment; spaced as standard with manufacturer for use indicated; and factory finished with matte-black baked finish.
 - i. Seismic/Wind Uplift Compression Struts: Verify and insert proper sizes required to comply with governing codes, as designed by registered structural engineer.

- E. Sheet Metal Characteristics: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.
- F. Aluminum Sheet: Roll-formed aluminum sheet, complying with ASTM B209; alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- G. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated to snap on and be securely retained on carriers without separate fasteners, and finished to comply with requirements indicated.
- H. Pan Splices: Construction same as pans, in lengths 8 to 12 inches (200 to 300 mm); with manufacturer's standard finish.
- I. End Caps: Metal matching pans; fabricated to fit and conceal exposed ends of pans.
- J. Filler Strips: Manufacturer's standard material; fabricated to uninterruptedly close voids between pans.
- K. Edge Moldings and Trim: Provide exposed members as indicated or required to comply with seismic requirements of authorities having jurisdiction, to conceal edges of penetrations through ceiling, to conceal ends of pans and carriers, for fixture trim and adapters, for fascia at changes in ceiling height, and for other conditions; of metal and finish matching linear metals.

2.4 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Color-Coated Finish: Manufacturer's standard powder-coat baked paint finish complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.

2.6 ACCESSORY MATERIALS

- 1. Edge Trim: Manufacturer's standard trim moldings to match panel finish

2. Air Distribution Devices: Provide distribution devices that are independently suspended, relocatable, adjustable from below finished ceiling, and capable of being concealed behind (invisible to view) and fully integrated with ceiling system so as to allow no interruption of ceiling components.
3. Lighting Fixtures: Provide fixtures capable of being fully integrated with ceiling system and requiring no interruption of ceiling components, that are independently suspended, and as selected to conform to lighting criteria specified in Division 16.
4. Access Panels: Where access is required above ceiling, location shall be approved by Owner; Provide concealed door hinge assembly, retainer clip, and retainer bar, assembled with ceiling panels and carrier sections into access doors of required size, permitting upward or downward opening

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. General: Install linear metal ceilings to comply with CBC Standard 25-2 and seismic requirement indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 1. Standard for Ceiling Suspension System Installations - ASTM C 636
 2. Standard for Ceiling Suspension Systems Requiring Seismic Restraint - ASTM E 580
 3. Install hangers plumb and free from contact with insulation or other objects within plenum that are not part of supporting structure or of ceiling suspension system.
 4. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counters playing, or other equally effective means.
 5. Where width of ducts and other construction within 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.
 6. Secure wire hangers to ceiling suspension members and to supports above with a minimum of four tight turns. Connect hangers directly to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 8. Do not attach hangers to steel deck tabs.
 9. Space hangers not more than 48 inches (1200 mm) oc 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.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers but without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.

END OF SECTION 09 5423

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SECTION 09 64 23 –VAPOR EMISSION TREATMENT SYSTEM

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 SECTION INCLUDES

- A. Liquid applied floor treatment for newly poured substrates that are scheduled to receive engineered wood, resilient and carpet tile products. System shall prevent the transfer of relative humidity levels, which causes floor bubbling, peeling, adhesive failure and floor dampness after installations.

1.3 RELATED SECTIONS

- A. Section 03 30 00 – Cast-in-Place Concrete.
- B. Section 09 64 30 - Engineered Wood Flooring: Moisture-retardant adhesive used for installation of engineered wood flooring system.

1.4 QUALITY ASSURANCE

- A. Applicator: Certified by the manufacturer of special coating system and shall provide proof of certification and shall have valid California C-15, C-61 or C-33 contractor's license.
- B. Manufacturer: Minimum of five (5) years producing specified make, model number, product name and no formulation change.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Products shall meet current local, State and Federal environmental laws.
- B. Provide adequate ventilation during application within an enclosed space.
- C. Disposal of containers and materials and associated labor costs shall be the responsibility of the applicator.
- D. Installed in building climates that are representative of the finished building atmosphere. Minimum of 65 degrees Fahrenheit or above 50%RH prior to, during and 48 hours after installation process.

1.6 WARRANTY

- A. Submit 15 year written warranty covering all costs of treatment system products, process controls, replacement of finished flooring and adhesive and associated labor.

- B. Warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Moisture vapor emission to be less than 3 lbs per 1000 sq. ft per twenty-four hours test per ASTM F1869 after finish installation.
- B. Coatings: Meet the following:
 - 1. EPA Method 24 testing of less than 65 g/liter, by independent laboratory testing.
 - 2. Contains no formaldehyde, formaldehyde precursors and zero-carcinogens
 - 3. Contains zero hazardous air pollutants (HAP's)

2.2 MATERIALS

- A. General: Two-component epoxy based treatment for penetrating dry, damp and wet concrete floor surfaces. Product shall maintain adhesion to concrete containing silicates and resin treatments.
- B. Moisture Tolerant Primer: Two-component, non-porous type for chemically bonding cement products to treatment surface.
- C. Cement Topcoat: Portland cement, self-leveling cement product meeting a compressive strength of 4,500 psi per ASTM C109/C109M as approved by manufacturer.
- D. Joint & Crack Treatment: Two-component epoxy approved by manufacturer.
- E. Laboratory Test - Treatment Properties:
 - 1. Water Vapor Transmission: ASTM E96/E96M;
 - a. Grams/h · m² of less than 0.7 (or less)
 - b. Nanograms/ Pa · s · m² of less than 81.1 (or less)
 - 2. Alkali Resistance – 30 days: ASTM D1308
 - a. Resistant to 35% potassium hydroxide exposure.
 - b. Resistant to 14pH solution exposure.
 - 3. Concrete Adhesion – Pull off Strength
 - a. ASTM D4541 and ASTM D7234 Adhesion - 100% concrete cohesive failure
 - 4. Environmental Properties
 - a. EPA Method 24 testing of less than 65 g/liter
 - b. Contains no formaldehyde, formaldehyde precursors and zero-carcinogens
 - c. Contains zero hazardous air pollutants (HAP's)
 - d. Meets Section 01350 - California Department of Health Services Standard practice requirements for classroom and office space
 - 5. Water Vapor Emission: ASTM F1869; Capable of restricting water vapor emission of 15 lbs. to a controlled level less than 2.0 lbs.

6. Internal Relative Humidity: ASTM F2170; Tolerant to substrates where relative humidity levels are 100%RH.
7. Alkalinity-pH Tolerance: ASTM F710; Resistant to 14pH exposure

PART 3 - EXECUTION

3.1 SUBSTRATE COMPLIANCE

- A. Apply liquid applied treatment system rated to restrict 100%RH and 14pH at all floor surfaces before flooring products are installed.

END OF SECTION 09 61 23

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SECTION 09 64 30 – ENGINEERED WOOD FLOORING

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 SECTION INCLUDES

- A. Engineered wood plank flooring, base and wood reducer strips

1.3 RELATED SECTIONS

- A. Section 06 10 53 - Miscellaneous Carpentry

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Source Limitations: For field-finished wood flooring, obtain each species, grade, and cut of wood from one source with resources to provide materials and products of consistent quality in appearance and physical properties.
- C. Forest Certification: For all wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship".
- D. Mockups: Prepare an area of wood flooring to serve as a mockup to demonstrate aesthetic effects and qualities of materials and execution. Use materials and methods proposed for completed Work.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of engineered wood flooring that do not comply with requirements or that fail in materials, fabrication, or installation within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of flooring finishes, and other materials beyond normal wear.
 - b. Structural failure of flooring material.
 - 2. Warranty Period: 10 years from date of Project Acceptance.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Engineered Wood Strip Flooring:

1. Basis of Design: Nydree Floor
2. Type: Engineered, tongue and grooved, micro-beveled edge.
3. Hardwood Flooring:
 - a. Thickness: 7/16-inch thick.
 - b. Dimensions: 5-1/4-inch wide, random lengths.
 - c. Species and Color Options: Maple.
 - d. Infused Color: Natural.
 - e. Topical Stain: Latte.
 - f. Wood Material: Solid.
4. Finish: Factory finished acrylic impregnated wear layer with factory applied UV-cured urethane.

2.2 ACCESSORIES

- A. Acoustical Underlayment: as recommended by flooring manufacturer.
- B. Base: Rubber. See Section 09 65 00.
- C. Shims: As required to level the floor under reducer strips.
- D. Reducer Strips: 2 inches (51 mm) wide, tapered on 1 side, and in thickness matching wood flooring.
- E. Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated. Use adhesive that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24): 60 g/L.
- F. Masking Tape: as recommended by flooring manufacturer. (Do not use "blue tape.").
- G. Surface Cleaner: as recommended by flooring manufacturer.

PART 3 - EXECUTION

- A. Substrate Moisture Testing, General: Perform tests recommended by manufacturer or, if none, comply with applicable recommendations in NWFAs "Installation Guidelines: Wood Flooring".
 1. Proceed with installation only after substrates pass testing.
- B. Concrete Substrates: Prepare according to ASTM F710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 3. Moisture and Alkalinity Testing:
 - a. Perform at a rate of three tests for the first 1,000 square feet and one additional test for each 1,000 square feet thereafter.
 - b. Anhydrous Calcium Chloride Test: ASTM F1869; proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - c. Internal Relative Humidity Test: ASTM F2170; proceed with installation only after substrates have a maximum relative humidity level of 75%RH or less.

- d. Digital Alkalinity-pH Test: ASTM F710; proceed with installation only after substrates have a result of 9.0pH or less.
- e. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

END OF SECTION 09 64 30

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SECTION 09 64 33 – SPRUNG WOOD FLOORS

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 SECTION INCLUDES

- A. Floating, elastic floor assembly for performance.
- B. vented rubber cove base.

1.3 RELATED SECTIONS

- A. Section 09 64 30 - Engineered Wood Flooring.
- B. Section 09 65 00 – Resilient Floor: Vented rubber cove base

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Member of Wood Flooring Manufacturers Association (WFMA) or Maple Flooring Manufacturers Association (MFMA).
- B. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- C. Forest Certification: Provide components made with not less than 50 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- D. Single-Source Responsibility for Flooring: Obtain each type, color, and pattern of resilient flooring from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- E. Fire Performance Characteristics: Provide resilient flooring with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45 watts per sq.cm or more per ASTM E648.
 - 2. Smoke Density: Less than 450 per ASTM E662.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Connor, Neoshok

2.2 MATERIALS

- A. Strip Flooring: Indicate grade on each piece.
1. Species: Hard White Maple; Select Grade as approved by Architect and Owner's representative.
 2. Strip Sizes: 2-1/4" wide by 25/32" thick; random lengths; precision tongue and groove ends and edges except where otherwise directed and recommended by MFMA or WFMA.
 3. Pattern: Straight pattern
 4. Treatment: Clear penetrating treatment, water-repellent, providing protection against mold, mildew, staining, and decay fungi, as recommended by wood flooring fabricator.
 5. Divider and Edge Strips: Match wood strip flooring.
 6. Finish: Gymnasium quality.
- B. System:
1. Moisture barrier, as specified herein.
 2. Two layers plywood sheets, 2x12mm thick each.
 3. NeoShok pads
 4. Vented cove base with expansion space against perimeter walls
 5. Maple strip flooring.
- C. Subflooring:
1. Plywood Underlayment: APA C-D Grade, Exterior grade subfloor sheathing, Douglas fir, western larch, or southern pine plywood.
 - a. Comply with requirements specified in Section 061053 - Miscellaneous Rough Carpentry.
 - b. Thickness: 1/2" unless otherwise indicated.
 2. Rubber Pads: Type recommended by manufacturer for ballet exercise type wood flooring installed over plywood subfloor installed on cushioned pads; 2-1/4" by 3" by 3/8" thick.
 - a. Tensile Strength: ASTM D412, minimum tensile strength of 1500 psi.
 - b. Aging: ASTM D395, Method A Test; verify maximum change in hardness of 10 points, and maximum change in tensile strength of 25%, and maximum change in ultimate elongation of 25%.
 3. Subject sample to 70 hour aging and 158 degree F temperature exposure, and allowed to cool to room temperature.
- D. Wood Strip Flooring Fasteners: Blind nail strip flooring to subfloor as recommended by MFMA.
- E. Floor Finish: Gymnasium quality polyurethane or modified polyurethane; type as recommended by flooring manufacturer.
1. Sheen: Gloss.
 2. Sealer: As recommended by finish manufacturer.
 3. Finish Coats: Minimum two coat system over sealer.
 4. Volatile Organic Compound (VOC) Emissions: Provide materials with VOC emissions less than limits established by South Coast Air Quality Management District Rule #1168.
 - a. Sealants used as fillers shall exceed requirements of BAAQMD Regulation 8, Rule 51.

2.3 ACCESSORIES

- A. Moisture Barrier: . Polyethylene sheet (0.15mm) as required and recommended by flooring manufacturer.
- B. WoodWall Base: Provide vented cove base as standard with manufacturer of flooring system.
- C. Shims: As required to level the floor under reducer strips.
 - 1. Basis-of-Design: Neoshok , resilient pads.
 - 2. Provide partial reinforcement blocks as recommended by flooring system manufacturer.
- D. Reducer Strips: 2 inches (51 mm) wide, tapered on 1 side, and in thickness matching wood flooring.
- E. Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.
 - 1. Use adhesive that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24): 60 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Substrate Moisture Testing, General: Perform tests recommended by manufacturer or, if none, comply with applicable recommendations in NWFA's "Installation Guidelines: Wood Flooring".
 - 1. Proceed with installation only after substrates pass testing.
- B. Concrete Moisture Testing: Perform anhydrous calcium chloride test per ASTM F1869, as follows:
 - 1. Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m) and perform not less than 2 tests in each installation area with test areas evenly spaced in installation area.
 - 2. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.

3.2 WOOD STRIP FLOORING INSTALLATION

- A. Comply with MFMA recommendations.

3.3 FLOOR FINISH

- A. Apply finishing materials in minimum two finish coats in accordance with MFMA Specifications for Heavy Duty and Gymnasium Finishes, manufacturer's printed instructions

END OF SECTION 09 6433

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SECTION 09 65 00 - RESILIENT FLOORING

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 SECTION INCLUDES

- A. Cork-rubber sheet flooring.
- B. Resilient wall base, reducer strips, and other accessories.

1.3 RELATED SECTIONS

- A. Section 09 6813 - Tile Carpeting.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
 - 1. Furnish not less than 10 linear feet for each 500 linear feet or fraction thereof, in roll form of each different wearing surface, color, and pattern of cork flooring.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are approved and certified by flooring manufacturer, as well as competent in techniques required by manufacturer for floor covering installation and seaming method indicated.
- B. Single-Source Responsibility for Flooring: Obtain each type, color, and pattern of resilient flooring from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- C. Fire Performance Characteristics: Provide resilient flooring with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45 watts per sq.cm or more per ASTM E648.
 - 2. Smoke Density: Less than 450 per ASTM E662.
- D. Hard Surface Flooring: Provide flooring and adhesives meeting criteria for FloorScore certification by SCS (Scientific Certification Systems) and RFCI (Resilient Floor Covering Institute).

- E. Static-Control Properties: Provide floor coverings with static-control properties indicated as determined by testing identical products per test method indicated by an independent testing and inspecting agency.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace of resilient flooring that does not comply with requirements or that fail in materials, fabrication, or installation within specified warranty period.
 - 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

- A. Basis-of-Design Manufacturer: Expanko XCR4
 - 1. Color: to be selected by Architect and Owner from manufacturer's standard color selection.
 - 2. Finish: Three coats commercial grade water-based matte polyurethane as recommended by flooring manufacturer.

2.2 CORK FLOORING:

- A. Cork rubber flooring: 60% cork, 40% rubber, material shall be colored throughout with fade resistant pigments.
 - 1. Slip Resistance: Material shall exceed all ADA requirements
 - 2. Material shall meet Federal specification LLL-T-43 lb, Type 1 & 2.
 - 3. Cork floor tile shall be coated on the back side with a balancing material to prevent tile curling.
 - 4. Finishes: Water-based matte polyurethane.
 - 5. Profile: Smooth, lightly textured surface.
 - 6. Slip Resistance: Material shall exceed all ADA requirements
 - 7. Fire Resistance: Class I (ASTM E648)
 - 8. Density: 35 lbs/cu ft.
 - 9. Material shall meet Federal specification LLL-T-43 lb, Type 1 & 2 and be halogen free.
 - 10. Cork floor tile shall be coated on the back side with a balancing material to prevent tile curling
 - 11. Tensile Strength- higher than 700psi.
 - 12. Halogen free

2.3 INSTALLATION ACCESSORIES

- A. Adhesive: Zero VOC (calculated), water based, white acrylic latex adhesive, suitable for installation onto smooth level concrete or plywood sub-floors, water-resistant when cured.

2.4 RUBBER BASE

- A. Resilient Wall Base: ASTM F1861, Type TS (rubber, vulcanized thermoset).
 - 1. Group (Manufacturing Method): I (solid, homogeneous).
 - 2. Style:

- a. At Stained Concrete Floors, Sealed Concrete Floors, and Resilient Flooring: Cove (with top-set toe).
- b. At Carpeting: Straight (toeless).
- c. Vented at engineered wood floor and sprung wood floor.
3. Minimum Thickness: 0.125-inch (3.2 mm).
4. Height: 4-inches (102 mm).
5. Lengths: Coils in manufacturer's standard length.
6. Outside Corners: Premolded.
7. Inside Corners: Premolded.
8. Surface: Smooth.

2.5 INSTALLATION ACCESSORIES

- A. Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.
- B. Trowelable Leveling and Patching Compound: Latex-modified, Portland cement based or blended hydraulic-cement based formulation provide or approved by resilient product manufacturer for application indicated.
- C. Adhesives (Cements): Water-resistant type recommended by tile manufacturer to suit resilient floor tile products and substrate conditions indicated.
 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24 and South Coast Air Quality Management District Rule #1168).
 - a. Adhesives: 50 g/L.
- D. Heat-Welding Bead: Solid-strand product of floor covering manufacturer.
 1. Color: Match floor covering.
- E. Integral-Flash-Cove-Base Accessories:
 1. Cove Strip: 1-inch (25-mm) radius provided or approved by floor covering manufacturer.
 2. Cap Strip: Square metal, vinyl, or rubber cap provided or approved by floor covering manufacturer.
 3. Corners: Metal inside and outside corners and end stops provided or approved by floor covering manufacturer.
- F. Edge Strips: Burke/Mercer Flooring Products or Roppe; rubber, carpet-to-resilient flooring strips; color to be selected.
- G. Floor Polish: Provide protective metal, cross-linked acrylic floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Concrete Substrates: Prepare according to ASTM F710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
3. Moisture and Alkalinity Testing:
 - a. Perform at a rate of three tests for the first 1,000 square feet and one additional test for each 1,000 square feet thereafter.
 - b. Anhydrous Calcium Chloride Test: ASTM F1869; proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - c. Internal Relative Humidity Test: ASTM F2170; proceed with installation only after substrates have a maximum relative humidity level of 75%RH or less.
 - d. Digital Alkalinity-pH Test: ASTM F710; proceed with installation only after substrates have a result of 9.0pH or less.
 - e. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

3.2 RUBBER SHEET FLOORING INSTALLATION

- A. Heat-Welded Seams: Comply with ASTM F1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.
- B. Conform to RFC1-TM-6 for joint tightness and for corner intersection unless layout pattern shows random corner intersection. More than 5 percent of the joints not touching or any joint more than 0.0051-inch wide will not be accepted.

END OF SECTION 09 65 00

SECTION 09 65 50 RUBBER ATHLETIC FLOORING

PART 1 - GENERAL DESCRIPTION

1.01 DESCRIPTION

A. Scope

1. The complete installation of polyurethane surfacing over shock pad base including adhesives, base mat, polyurethane sealer, polyurethane resin, and surface finish.

B. Related work specified under other sections

1. Substrate Buildup:
 - a. Concrete: Section 03 30 00
2. Slab Depression
 - a. Depression shall be 2 inches.
3. Slab Tolerance
 - a. Slab tolerance is (+/-) 1/8" in radius of 10', surface steel troweled.
 - b. NO CURING AGENTS OR SEALERS ARE TO BE APPLIED TO THE CONCRETE SLAB. Coordinate this with the General Contractor prior to any concrete being poured.
4. Vapor Barrier:
 - a. Concrete subfloors on or below grade shall be adequately waterproofed beneath and at the perimeter of the slab and on the earth side of below-grade walls.

1.02 QUALITY ASSURANCE

A. Supplier Qualifications

1. Supplier shall be an established firm experienced in field. Pre-approved manufacturers:
 - a. Durasound Rubber Acoustic Tiles (Basis of design)
 - b. Robbins, Inc.
 - c. Connor Sports Flooring.
 - d. Champion Flooring.

B. Installer Qualifications

1. Floor contractor shall be experience in the flooring filed and approved by Supplier.
2. Flooring contractor shall be factory-approved and have completed at least three projects of similar magnitude and complexity.
3. Submit three copies of supplier's recommendations for correct preparation, finishing and testing of concrete subfloor surface to receive granulated base mat ant polyurethane floor system.

1.03 DELIVERY AND STORAGE

A. Delivery of Materials

1. Material shall not be delivered or installed until all masonry, painting, plastering, tile work, marble and terrazzo work are completed, and all overhead mechanical work, lighting, backstops, scoreboards are installed. Room temperature shall be at least 55 degrees Fahrenheit and moisture content of concrete slab of 4% or less.
2. Area where materials are to be stored should be maintained at 55 degrees Fahrenheit and under 50% relative humidity by the General Contractor.

1.04 JOB CONDITIONS

A. Schedule of Installation

1. Do not install floor system until concrete has been cured sixty (60) days, and the conditions in Paragraphs 1.01 and 1.04 are obtained.
2. Environmental temperatures must average a minimum of 65 degrees Fahrenheit for one full week preceding, throughout, and 72 hours following application.
3. After sports surface is installed area is to be kept locked by General contractor to allow curing time for the paint and finish system(s). No other trades are to be allowed on floor until it is accepted in writing by owner or owner's authorized agent.

1.05 GUARANTEE

- A. Installation shall be jointly warranted by the manufacturer and installer for a period of one (1) year.

1.07 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish 10 extra full tiles.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Durasound Rubber Acoustic Tiles (Basis of design); color to be selected from manufacturer's full range of colors.

B. Technical Information

Shock Absorption (DIN 18032)	35%
Impact Resilience (ASTM D-2632)	32%
Friction (ASTM D-1894) DRY	0.8 - 0.9
Ball Rebound (DIN 18032)	>90%
Surface Hardness (ASTM D-2240)	81-87 Shore A
Wear Resistance (ASTM C-501)	
- H18 Wheels, 1000 grams load, 1000 rev.	0.4 grams loss of weight
- CS17 Wheels, 1000 grams load, 1000 rev.	0.089 mm loss of thickness
Tensile strength	975 psi.
Elongation at break	110-120%
Tear strength (DIN 53515)	111 pli
Water absorption (surface)	<2%
Inflammability (DIN 51960)	Inflammable
Heat resistance	0.089 m2 K/W

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect concrete substrate for dryness, proper tolerance, and possible contamination, and report any discrepancies to General Contractor in writing.

- B. Coordinate with the General Contractor to flush the area this flooring system is to be installed with dry exterior air for a minimum of 4 hours each afternoon [that it is dry outside] for a minimum of two weeks.
- C. Substrate shall be broom cleaned by the General Contractor.
- D. Provide a drying system similar to Munters [www.Munters.com] for a minimum of 1.5 weeks prior to testing the floor for preinstallation dryness.
- E. Installer shall perform tests for moisture and adhesion prior to application and report adverse conditions to the general contractor in writing.

3.02 INSTALLATION

- A. Per manufacturer's recommendations.
- B. Clean up all unused materials and debris and remove from the premises. Dispose of empty containers in accordance with federal and local statutes.

3.03 PROTECTION

- A. Cure Time
 - 1. No traffic or other trades shall be allowed on the surface for a period of one week following completion to allow for complete and proper cure of the finish.
- B. Other Trades
 - 1. It shall be the responsibility of the general contractor to protect the surface from damage by other trades before acceptance by the owner.
- C. Safety
 - 1. No smoking, open flames or sparks from electrical equipment or any other source shall be permitted during the installation process, or in areas where materials are stored.

END OF SECTION

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SECTION 09 67 23 - EPOXY FLOORING

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 SECTION INCLUDES

- A. Epoxy flooring systems with epoxy body coat(s).

1.3 SYSTEM DESCRIPTION

- A. The work shall consist of preparation of the substrate, the furnishing and application of a cementitious urethane based self-leveling seamless flooring system with flintshot quartz aggregate broadcast and urethane topcoat.
- B. The system shall have the color and texture as specified by the City Representative with a nominal thickness of 3/16 inch. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.
- C. Cove base (if required) to be applied where noted on plans and per manufacturers standard details unless otherwise noted

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying epoxy flooring systems similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to epoxy flooring manufacturer.
 - 1. Engage an installer who is certified in writing by epoxy flooring manufacturer as qualified to apply epoxy flooring systems indicated.
- B. Source Limitations: Obtain primary epoxy flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, through one source from a single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.
- C. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Apply full-thickness mockups on 48-inch- (1200-mm-) square floor area selected by Architect and Owner.
 - a. Include 48-inch (1200-mm) length of integral cove base.
 - 2. Simulate finished lighting conditions for Architect's and Owner's review of mockups.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Project Acceptance.

PART 2 - PRODUCTS

2.1 EPOXY FLOORING

- A. Basis-of-Design Product
 - 1. Dur-A-Flex, Inc, Poly-Crete SLB Flooring System installed with Elast-O-Coat Membrane and Poly-Crete Color Fast.
- B. System Characteristics:
 - 1. Color and Pattern: As selected by Architect and Owner from manufacturer's full range.
 - 2. Wearing Surface: Manufacturer's standard orange-peel texture.
 - 3. Integral Cove Base: 6 inches (100 mm) high.
 - 4. Overall System Thickness: 32 mil (3/16").
- C. Properties:
 - 1. Hardness: ASTM D2240; 65 Shore D
 - 2. Compressive Strength: ASTM C579; 7800 psi
 - 3. Flexural Strength (psi): ASTM D790; 5076 psi
 - 4. Tensile Strength: ASTM D638; 4200 psi
 - 5. Modulus of Elasticity: ASTM 469; 28 days 3.67×10^6 (psi)
 - 6. Abrasion Resistance CS17 Wheel 1000 GM Load 1,000 Cycles: ASTM D4060; 30 mg loss.
 - 7. Coefficient of Friction: ASTM D 2047; 0.9, passes ADA recommendations
 - 8. VOC Content: 0 g/l
 - 9. Indoor Air Quality: CA 01350 Compliant.

2.2 ACCESSORY MATERIALS

- A. Patching and Fill Material: Epoxy product of or approved by epoxy flooring manufacturer and recommended by manufacturer for application indicated.
- B. Joint Sealant: Type recommended or produced by epoxy flooring manufacturer for type of service and joint condition indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with epoxy flooring.
 - 1. Roughen concrete substrates as follows:
 - a. Comply with ASTM C811 requirements, unless manufacturer's written instructions are more stringent.
 - b. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or approved equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely

- removed leaving a bare concrete surface having a minimum profile of CSP 4-6 as described by the International Concrete Repair Institute.
2. Verify that concrete substrates are dry.
 - a. Perform anhydrous calcium chloride test, ASTM F1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) of slab in 24 hours.
 - b. Perform plastic sheet test, ASTM D4263. Proceed with application only after testing indicates absence of moisture in substrates.
 - c. Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.
 3. Verify that concrete substrates have neutral Ph and that epoxy flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

END OF SECTION 09 67 13

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SECTION 09 68 13 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Modular, non-indexed carpet tile.

1.3 RELATED SECTIONS

- A. Section 09 65 00 – Resilient Flooring: Resilient wall base and accessories installed with carpet tile.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is approved by carpet tile manufacturer and certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements with a minimum of 5 years continuous experience in the installation of the types of carpet tile specified.
- B. Carpet Surface Burning Characteristics: Provide carpet identical to that tested for the following fire performance characteristics, per test method indicated below. Identify carpet with appropriate markings of applicable testing and inspecting organization.
 - 1. Test Method: ASTM E84.
 - 2. Flame Spread: 75 or less.
 - 3. Fire Hazard Classification: Class I floor finish.
 - 4. Minimum critical flux limit of 0.45-watts/square centimeter when tested in accordance with NFPA 253.
- C. Static electricity generation of installed carpet shall not exceed 3.5 KV at 70-deg. F and 20-percent R.H. for life of carpet tile.
- D. Carpet Tile Low-VOC Emissions: Provide carpet and cushion materials that have been tested and certified to indicate carpet, carpet backings, cushions, and adhesives emit no or low VOCs (volatile organic compounds). Provide products carrying the following certifications:
 - 1. CRI Green Label.

- E. Mockups: Before installing carpet tile, build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approved mockups may become part of the completed Work if undamaged at time of Project Acceptance.

1.6 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excess static discharge, and delamination.
 - 3. Warranty Period: 10 years from date of Project Acceptance.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Carpet shall be certified by the California Gold Sustainable Carpet Standard at the gold or platinum level. Carpet tile systems shall not exceed the target emissions factors of the Carpet and Rug Institute's following programs:
 - 1. Carpet: Green Label Plus Program and Testing Procedures.
 - 2. Carpet Adhesive: Green Label Program and Testing Procedure.
 - 3. Handicapped Requirement - $4500 (\text{min}) = (\text{yarn weight}) (36) \text{ divided by pile height}$.
- B. Manufacturers: Shaw Contract, Interface Contract, Mohawk Group
- C. Performance Characteristics:
 - 1. Tuft Bind (ASTM D-1335): Modular
 - a. If cut pile: 3.0 lbs minimum average
 - b. If loop pile: 8.0 lbs minimum average value
 - 2. Delamination Resistance of the secondary backing: 2.5 lbs. per inch minimum ASTM D3936
 - 3. Colorfastness:
 - a. Crocking (AATCC 165): Color transfer Class 4 minimum, wet and dry, when tested as specified
 - b. Colorfastness to Light (AATCC 16, Option 3): Color change between the exposed and unexposed carpet areas equipvealent to a minimum of Grade 4 on the Gray Scael for COor Change after an exposure of 40 AFU (AATCC fading units) for all specified colors
 - 4. Electrostatic Propensity (AATCC 134) General use commercial carpet- 3.5 kV max
 - 5. Flammability Properties: Carpet installation must comply with all applicable flammability regulations for the end use application selected. All carpets must comply with the small scale flammability ignition source, 16 CFR 1630 and/or ASTM D-2859 (Methanamine Pill Test)
 - 6. Indoor Air Quality:

- a. Comply with CRI Green Label Plus Indoor Air Quality Testing Program
 - b. Installation Adhesive and Seam Sealers: Compliance with CRI Green Label Plus Indoor Air Quality Testing Program
 - c. Cushion and Underlayment: Cushions or padding installed under the carpet must be compliant with CRI Indoor Air Quality Cushion Testing Green Label Plus Program
7. Modular Tile Dimensional Stability: 0.15 percent maximum to ISO 2551 (Aachen Test)
- D. Product Characteristics:
1. Fiber Content: 100 percent solution dyed universal type 6,6 or type 6,6 nylon-branded yards or Aquafil type 6 nylon or type 6 nylon-branded yards
 2. Primary backing: Non-PVC material
 3. Secondary backing/cushion: U.S. EPA Comprehensive Procurement Guidelines for Carpet cushion
 4. Surface Texture: Tufted “cut and loop” or cut pile
 5. Average pile yard weight: 17 ounce/square yard minimum (ASTM D-5848)
 6. Machine gauge: 1/10 minimum
 7. Pile thickness: 0.06 minimum

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
1. VOC Limits: Provide adhesives that comply with the following limits for VOC content when tested according to ASTM D 5116:
 - a. Total VOCs: 10.00 mg/sq. m x h.
 - b. Formaldehyde: 0.05 mg/sq. m x h.
 - c. 2-Ethyl-1-Hexanol: 3.00 mg/sq. m x h.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Concrete Subfloors: Verify that concrete slabs comply with ASTM F710 and the following:
1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
 2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
 4. Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

5. Moisture and Alkalinity Testing:
 - a. Perform at a rate of three tests for the first 1,000 square feet and one additional test for each 1,000 square feet thereafter.
 - b. Anhydrous Calcium Chloride Test: ASTM F1869; proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - c. Internal Relative Humidity Test: ASTM F2170; proceed with installation only after substrates have a maximum relative humidity level of 75%RH or less.
 - d. Digital Alkalinity-pH Test: ASTM F710; proceed with installation only after substrates have a result of 9.0pH or less.
 - e. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

END OF SECTION 09 68 13

SECTION 09 84 14 –ACOUSTICAL WALL PANELS

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 SECTION INCLUDES

- A. Shop-fabricated Fabric-wrapped tackable, acoustical and non-tackable acoustic wall panels.

1.3 RELATED SECTIONS

- A. Section 06 41 00 –Architectural Woodwork.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tackable Wall Panels: Full-size units equal to 2 percent of amount installed.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Acoustical Wall Panels: Obtain acoustical wall panels from one source with resources to provide products of consistent quality in appearance and physical properties.
- B. Fire-Test-Response Characteristics: Provide acoustical wall panels with the following surface-burning characteristics as determined by testing identical products per ASTM E84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify acoustical wall panels with appropriate markings of applicable testing and inspecting agency.
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 450 or less.

PART 2 - PRODUCTS

2.1 TACKABLE ACOUSTICAL WALL PANELS

- A. Construction, Tackable Acoustic Panels: Noncombustible and dimensionally stable glass fiber core, 6-7 pcf, laminated with high density acoustically transparent face, resin-hardened edges and connection points, high impact control sheet, and fabric covering.
 - 1. NRC: 0.90.
 - 2. Fabric: Manufacturer-approved fabric
 - a. Flammability: ASTM E84 Tunnel Test:
 - 1) Flame Spread Rating: Class A, 25 or less.

- 2) Smoke Developed Rating: 15 or less.
3. Light Reflectance: ASTM C523; using a standard white finish, the average light reflectance value of .82.
4. Sound-Absorption Performance: Provide acoustical wall panels with minimum noise reduction coefficients indicated, as determined by testing per ASTM C423 for mounting type specified.
5. Core: Manufacturer's standard.
6. Edge construction: Manufacturer's standard chemically hardened core with no frame

2.2 2.2 NON TACKABLE ACOUSTICAL WALL PANELS

- A. Construction, Non-Tackable Panels:
 1. Basis-of-Design: Decoustics Low Frequency Tuner, LFT
 2. Panel Thickness: 2-1/16-inches.
 3. Edges: Square.
 4. Corners: Square.
 5. NRC: NA
 6. Finish: Factory-applied, fine-textured coating, applied to porous textile material.
 7. Construction: Noncombustible and dimensionally stable glass fiber core, 6-7 pcf.
- B. Fabric-Wrapped Acoustical/NonTackable Wall Panels: Criteria, sizes, fabrics, composition, mounting method, and fabrication requirements to be selected.
- C. Fabricate panels to sizes and configurations indicated; attach facing materials to cores to produce installed panels with visible surfaces fully covered and free from waves in fabric weave, wrinkles, sags, blisters, seams, adhesive, or other foreign matter.
 1. Fabricate back-mounted panels in factory to exact sizes required to fit wall surfaces, based on field measurements of completed substrates indicated to receive acoustical wall panels.
 2. Where square corners are indicated, tailor corners.
 3. Where fabrics with directional or repeating patterns, or directional weave, are indicated, mark fabric top and attach fabric in same direction.
 4. Where fabric facings with seams are indicated, fabricate invisible seams and comply with Shop Drawings for location.
- D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch (1.6 mm) for the following:
 1. Thickness.
 2. Edge straightness.
 3. Overall length and width.
 4. Squareness from corner to corner.

2.3 ACCESSORIES

- A. Spline-Mounting Accessories: Manufacturer's standard concealed, extruded-aluminum or plastic connecting splines designed and fabricated for screw attachment to walls, with other moldings and trim for interior and exterior corners, leveling and base support, and as required. Provide panel manufacturer's standard factory-applied finish on exposed items in the following color:
 1. Color: Match color of facing material.

- B. Back-Mounting Accessories: Manufacturer's standard or recommended accessories for securely mounting panels, of type and size indicated, to substrates provided; and complying with the following requirements:
1. Mechanically Mounted Edge-Reinforced Panels: Metal panel-clip and base-support bracket system consisting of two-part panel clips, with one part of each clip mechanically attached to back of panel and the other part to wall substrate, designed to support panels laterally; and base-support brackets designed to support full weight of panels; with both designed to allow for panel removal.
 2. Mechanically Mounted Edge-Reinforced Panels: Metal impaling clips designed to support weight of panels, mechanically attached to wall substrate according to panel manufacturer's standard pattern and adhesively bonded to back of panel, with base-support brackets where recommended by manufacturer for additional support of panels.
 3. Mechanically Mounted Wood-Framed Panels: Z-clip hanger and magnet system with magnets recessed into frame and designed to engage steel mounting plates that are secured to wall with leveling mastic.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 09 84 14

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SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. First-line commercial-quality products for all coating systems.
- B. Provide 0-VOC products at interior locations throughout.
- C. Surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.
- D. Surface preparation, priming, and finish coats specified in this Section are in addition to shop-priming and surface treatment specified under other Sections.
- E. Painting exposed surfaces whether or not colors are designated in schedules, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect and Owner will select from standard colors or finishes available.
- F. Painting includes field-painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.
- G. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.
- H. Labels: Do not paint over Underwriters Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.
 - 2. Designated paint manufacturer to retain on file the paint formulations of each material and color applied.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.
- B. Field Samples: Apply field sample of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution prior to commencing work.
 - 1. Owner's representative will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Owner's representative will designate items or areas required.
 - 2. Components: One full component as directed.
 - 3. Simulate finished lighting conditions for review.
 - 4. Install field sample using means and methods identical to those that are going to be employed during full production.
 - 5. Allow coating to cure in accordance with manufacturer's written instructions.
 - 6. Perform adhesion test on existing paint to remain using X-cut method per ASTM D3359. Ratings 4A and 5A acceptable.
 - 7. Final approval of color selections will be based on field sample.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Owner's representative at no added cost to City.
 - 8. Approval of field sample does not constitute approval of deviations from the Contract Documents contained in field sample unless Architect and Owner specifically approves such deviations in writing.

1.5 WARRANTY

- A. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which dry erase coating system does not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials, fabrication, or installation within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: 3 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers for Paint Products: Benjamin Moore, Dunn-Edwards, Frazee, ICI, Kelly-Moore, Sherwin-Williams Co., or equal.

- B. Manufacturers for High Performance Coating Products: Subject to compliance with requirements, provide products by one of the following: Devoe Coatings, Precision Coatings, Inc., Tnemec Company, Inc., or approved equal.

2.2 GENERAL

- A. All paints must be low VOC and low odor
- B. Paints in high-humidity areas must be satin or semi-gloss finish with mildew resistant formulation
- C. Paint used in high contact areas must be satin or eggshell finish that is durable, washable and stain resistant.

2.3 EXTERIOR PAINTING SCHEDULE

- A. Concrete and Cement Plaster: Acrylic Finish: Two finish coats over a primer.
 - 1. Primer: Exterior concrete and masonry primer.
 - 2. Finish Coats: Exterior flat acrylic paint.
- B. Selected Metal Fabrications as Indicated, Decorative Metal, and Decorative Metal Railings Indicated to be Painted: High-Performance Finish:
 - 1. Primer: Shop-applied metal primer.
 - 2. Intermediate Coat: Epoxy modified primer.
 - 3. Topcoat: Semi-gloss acrylic polyurethane.
- C. Metal Doors and Frames, Flashings, and Other Miscellaneous Metal:
 - 1. Ferrous Metal: Acrylic Finish: Two finish coats over a rust-inhibitive primer.
 - a. Primer: Exterior ferrous-metal primer (not required on shop-primed items).
 - b. Finish Coats: Exterior semigloss acrylic enamel.
 - 2. Zinc-Coated Metal: Acrylic Finish: Two finish coats over a galvanized metal primer.
 - a. Primer: Exterior galvanized metal primer.
 - b. Finish Coats: Exterior semigloss acrylic enamel.
 - 3. Aluminum:
 - a. Acrylic-Enamel Finish: Two finish coats over a primer.
 - 1) Primer: Exterior aluminum primer under acrylic finishes.
 - 2) Finish Coats: Exterior semigloss acrylic enamel.

2.4 INTERIOR PAINTING SCHEDULE

- A. Gypsum Board:
 - 1. Typical Walls and Ceilings: 100% Acrylic finish, two finish coats over a primer.
 - a. Primer: Interior zero VOC/low odor gypsum board primer.
 - b. Finish Coats: Interior low-luster (eggshell) zero VOC/low odor acrylic enamel.
 - 2. Typical Toilet Room and Janitor Closet Walls and Ceilings: 100% Acrylic finish, two finish coats over a primer.
 - a. General: 100% Acrylic finish, two finish coats over a primer.
 - b. Primer: Interior zero VOC/low odor gypsum board primer.
 - c. Finish Coats: Interior zero VOC/low odor acrylic enamel, semi-gloss.

3. Acrylic Finish: General: 100% Acrylic finish, two finish coats over a primer.
 - a. Primer: Interior gypsum board primer.
 - b. Finish Coats: Interior 100% Acrylic finish.

- B. Metal Stairs, Decorative Metal, and Decorative Metal Railings Indicated to be Painted:
 1. Primer: Shop-applied metal primer.
 2. Intermediate Coat: Epoxy modified primer.
 3. Topcoat: Semi-gloss acrylic polyurethane.

- C. Metal Doors and Frames Indicated to be Painted, and Other Miscellaneous Metal: Acrylic finish, two finish coats over a primer.
 1. Ferrous Metal:
 - a. Acrylic Finish: Two finish coats over a primer.
 - 1) Primer: Interior zero VOC/low odor ferrous-metal primer.
 - 2) Finish Coats: Interior semigloss zero VOC/low odor acrylic enamel.
 2. Zinc-Coated Metal:
 - a. Acrylic Finish: Two finish coats over a primer.
 - 1) Primer: Interior zero VOC/low odor zinc-coated metal primer.
 - 2) Finish Coats: Interior semigloss zero VOC/low odor acrylic enamel.

- D. Wood: Acrylic-Enamel Finish: Two finish coats over a primer.
 - a. Primer: Interior zero VOC/low odor wood primer for acrylic-enamel and semigloss alkyd-enamel finishes.
 - b. Finish Coats: Interior semigloss zero VOC/low odor acrylic enamel.

2.5 MATERIALS

- A. Recycled Content: Use materials and products that contain the maximum amount of recycled content allowed that retains material integrity.

- B. VOC Content: Paints and coatings applied on-site on the interior of the building and products used on the interior of the building shall comply with VOC limits as specified in Section 01 8113 - Sustainable Design Requirements.
 1. Use materials that have the minimum VOC content in units of g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- C. Paint Materials: Provide only paint materials that meet the requirements of Green Seal documents.

- D. Chemical Components of Interior Paints and Coatings: Complying with VOC requirements.

- E. Exterior Colors: As indicated on Drawings.

- F. Interior Colors: As indicated on Drawings.

2.6 PAINT MATERIALS

- A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.
- B. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.
- C. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish the manufacturer's material data and certificates of performance for proposed substitutions.
- D. Colors: Match colors indicated by reference to the manufacturer's standard color designations.
- E. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 50 g/L.
 - 3. Dry-Fog Coatings: 150 g/L.
 - 4. Primers, Sealers, and Undercoaters: 100 g/L.
 - 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 - 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 - 7. Pretreatment Wash Primers: 420 g/L.
 - 8. Floor Coatings: 100 g/L.
 - 9. Shellacs, Clear: 730 g/L.
 - 10. Shellacs, Pigmented: 550 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Wood: 15 percent.
 - 3. Gypsum Board: 12 percent.
 - 4. Plaster: 12 percent.

3.2 SURFACE PREPARATION

- A. Steel Substrates: Clean ungalvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures

Painting Council (SSPC) specification SSPC-SP 10 and written instructions of paint manufacturer.

1. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 2. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
- B. Galvanized-Metal Substrates: Clean galvanized surfaces with nonpetroleum-based solvents so that the surface is free of oil and surface contaminants. Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
1. Treat exterior galvanized surfaces according to SSPC SP-7 and interior galvanized surfaces to SSPC SP-1.
- C. Painted surface shall be considered unacceptable if any of the following are evident under final lighting source (including daylight) for interior surfaces:
1. Visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 39-inches (1000 mm).
 2. Visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 39-inches (1000 mm).
 3. Visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
 4. When the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across full surface area.
 5. Coating exhibits lack of full adhesion to surfaces, including but not limited to bubbling, peeling, chipping, and other adhesion defects.
- D. Miscellaneous Surfaces and Procedures
1. Exposed mechanical items
 - a. Finish electric panels, access doors, conduits, pipes, ducts, grilles, registers, vents, and items of similar nature to match the adjacent wall and ceiling surfaces, or as directed.
 - b. Paint visible duct surfaces behind vents, registers, and grilles flat black.
 - c. Wash metal with solvent, prime, and apply 2 coats of alkyd enamel.
 2. Exposed pipe and duct insulation
 - a. Apply 1 coat of latex paint on insulation which has been sized or primed under other Sections; apply 2 coats on such surfaces when unprepared.
 - b. Match color of adjacent surfaces.
 - c. Remove band before painting, and replace after painting.
 3. Hardware
 - a. Paint prime coated hardware to match adjacent surfaces.
 - b. Paint metal portions of head seals, jamb seals, and astragal seals to match the color of the door frame unless otherwise directed by the Architect and Owner.
 4. Wet areas
 - a. For oil base paints, use 1 percent phenylmercuric or 4 percent tetrachlorophenol.
 - b. For water emulsion and glue size surfaces, use 4 percent sodium tetrachlorophenate.
 5. Exposed Vents: Apply 2 coats of heat resistant paint approved by the Architect and Owner.

- E. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with specified requirements.

3.3 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: City reserves the right to invoke the following procedure at any time and as often as City deems necessary during the period when paints are being applied:
 - 1. City will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. City may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

END OF SECTION 09 91 00

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SECTION 09 93 00 – STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Surface preparation and application of wood stains and clear wood finishes to exterior and interior wood.

1.3 RELATED SECTIONS

- A. Section 09 91 00 – Painting: Other exterior coatings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra stain materials from the same production run as the materials applied and in quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to City.
 - 1. Quantity: Furnish City with extra stain materials in quantities indicated below:
 - a. Semitransparent Stain: 5 gal. (18.75 L) of each color applied.
 - b. Clear Wood Finish: 5 gal. (18.75L).

1.5 QUALITY ASSURANCE

- A. MPI Standards:
 - 1. Products: Complying with MPI standards indicated and listed in its "MPI Approved Products List."
- B. Applicator Qualifications: A firm or individual experienced in applying exterior wood stains similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- C. Source Limitations: Obtain primers, stains, and other finishes through one source from a single manufacturer.
- D. Mockups: Apply benchmark samples of each finish system indicated and each color selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect and Owner will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect and Owner will designate items or areas required.
 - 2. Final approval of stain color selections will be based on benchmark samples.

- a. If preliminary stain color selections are not approved, apply additional benchmark samples of additional stain colors selected by Architect and Owner at no added cost to City.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 MATERIALS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.

B. Stain Colors: Match Architect's samples approved by Owner.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior stains and finishes applied at project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
2. Shellacs, Clear: VOC not more than 730 g/L.
3. Stains: VOC not more than 250 g/L.

2.3 EXTERIOR WOOD STAIN MATERIALS, GENERAL

A. Stain-Material Quality: Provide manufacturer's best-quality stain material of the various stain types specified that are factory formulated and recommended by manufacturer for application indicated. Stain-material containers not displaying manufacturer's product identification will not be acceptable.

2.4 INTERIOR WOOD STAIN MATERIALS, GENERAL

A. Stain-Material Quality: Provide manufacturer's best-quality stain material of the various stain types specified that are factory formulated and recommended by manufacturer for application indicated. Stain-material containers not displaying manufacturer's product identification will not be acceptable.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. City reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when finishes are being applied:

1. City Representative will engage the services of a qualified testing agency to sample finish materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance with product requirements.
3. City Representative may direct Contractor to stop applying finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces if, on refinishing with complying materials, the two finishes are incompatible.

END OF SECTION 09 93 00

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SECTION 09 96 00 – HIGH-PERFORMANCE COATINGS

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 SECTION INCLUDES

- A. Surface preparation and shop-application of high-performance coating systems at steel trellis framing system, trash enclosure gates, and fence supports.

1.3 RELATED SECTIONS

- A. Section 05 50 00 – Metal Fabrications: Priming architecturally exposed structural ferrous metal items.

1.4 QUALITY ASSURANCE

- A. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each color and type of coating required. Comply with procedures specified in PDCA P5.
 - 1. Miscellaneous Areas and Items: In area or on item selected.
 - 2. Final approval of finishes will be made from benchmark samples.
 - 3. Approved benchmark samples may become part of the completed Work if undisturbed at time of Project Acceptance.

1.5 WARRANTY

- A. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials, fabrication, or installation within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, products that may be incorporated into the Work include Corafalon ADS, Carboline Company, Duracoat, Durapon 70; DuPont Company, Tnemec Company, Inc., or approved equal.

2.2 MATERIALS

- A. Material Compatibility: For each finish indicated, provide separate component coat materials of one manufacturer that are compatible with one another and the substrates

indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

- B. Material Quality: Provide manufacturer's best-quality material for each coating material specified.
- C. Primer: See Section 05 50 00.
- D. Intermediate Coat: Epoxy intermediate coat of topcoat manufacturer recommended in writing for use with primer, and topcoat, and substrate indicated under environmental conditions indicated.

2.3 HIGH-PERFORMANCE COATING SCHEDULE

- A. Exterior Exposed Structural Steel, Exterior Architecturally Exposed Structural Steel Surfaces:
 - 1. Ferrous Metal:
 - a. First Coat: Primer formulated for moderate environment.
 - b. Second Coat: Intermediate coat.
 - c. Topcoat: Semigloss polyurethane.
 - 2. Color: semi-gloss to match Architect's sample approved by Owner.

PART 3 - EXECUTION

3.1 SHOP APPLICATION

- A. General: Application of coatings indicates Applicator's acceptance of surfaces.
- B. Coordination of Work: Review other Sections in which primers or other coatings are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of specified finish materials to ensure compatible primers.
 - 1. If a potential incompatibility of primers applied by others exists, obtain the following from primer Applicator before proceeding:
 - a. Confirmation of primer's suitability for expected service conditions.
 - b. Confirmation of primer's ability to be topcoated with materials specified.
 - 2. Notify Architect and Owner about anticipated problems before using coatings specified over substrates primed by others.
- C. Ferrous-Metal Substrate Surface Preparation: As specified in Section 05 50 00.
- D. Preparation of Galvanized AESS Steel to receive High-Performance Coating:
 - 1. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 - a. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
 - 2. Cleaning: Before applying high-performance coatings, clean substrates of substances that could impair bond of coatings. Remove oil and grease before cleaning.

3. AESS Primed Surfaces: Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, solvent clean, and touch up with same primer as the shop coat.
 4. Provide barrier coats over incompatible primers or remove primers and reprime substrate.
- E. Coating Material Preparation:
1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
 2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
- F. Coating Application:
1. Do not apply high-performance coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
 2. Apply coatings to exposed surfaces, including areas visible when permanent screen components are in place, and maintain system integrity and provide desired protection.
- G. Scheduling Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for coating as soon as practicable after preparation and before subsequent surface deterioration.
1. Omit primer on metal surfaces that have been shop primed and touchup painted.
 2. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
 3. Where manufacturer's written instructions require sanding, sand between applications to produce a smooth, even surface.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat does not cause undercoat to lift or lose adhesion.
 5. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance. Give special attention to edges, corners, crevices, welds, exposed fasteners, and similar surfaces to ensure that they receive a dry film thickness equivalent to that of flat surfaces.
- H. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brush Application: Use brushes best suited for material applied and of appropriate size for the surface or item being coated.
 - a. Apply primers and first coats by brush unless manufacturer's written instructions permit using roller or mechanical applicators.
 - b. Brush out and work brush coats into surfaces in an even film.
 - c. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.
 2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for the material and texture required.

3. Spray Equipment: Use mechanical methods to apply coating if permitted by manufacturer's written instructions and governing regulations.
 - a. Use spray equipment with orifice size recommended by manufacturer for material and texture required.
 - b. Apply each coat to provide the equivalent hiding of brush-applied coats.
 - c. Do not double back with spray equipment building-up film thickness of two coats in one pass, unless recommended by manufacturer.
 - I. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.
 - J. Prime Coats: Before applying topcoats, apply a prime coat of material, as recommended by manufacturer, to material required to be coated or finished that has not been prime coated by others.
 1. Recoat primed and sealed substrates if there is evidence of suction spots or unsealed areas in first coat, to ensure a topcoat with no burn-through or other defects caused by insufficient sealing.
 - K. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.
 - L. Cleanup: After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods.
- 3.2 FIELD TOUCH-UP
- A. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect and Owner, and leave in an undamaged condition.
 1. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work.
 2. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION 09 96 00

SECTION 09 96 23 – GRAFFITI-RESISTANT COATINGS

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 SECTION INCLUDES

- A. Graffiti-resistant coating

1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish one identified unopened 5-gallon container of each coating used, and cleaning agent in quantity equal to twelve 16-ounce bottles to be used for graffiti removal.
- B. Coating and cleaning agent shall not be used for re-coating or touching-up damaged surfaces before final acceptance of the work.
- C. Deliver materials and an inventory list just prior to Project Acceptance and store where directed by the City Representative.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Installation shall be performed by applicators with satisfactory experience in the application of the material to be used and trained for the application of the specified coating materials.
- B. Pre-installation Meeting: Convene a pre-installation meeting one week before the start of application of graffiti resistant coatings. Require attendance of parties directly affecting the work of this section, including the Contractor, Architect, Owner, applicator and his foreman, and manufacturer's representative. Items to review include, but are not limited to the following:
 - 1. Environmental regulations.
 - 2. Test panel procedures.
 - 3. Protection of surrounding areas not scheduled to receive coating.
 - 4. Surface preparation.
 - 5. Application procedures.
 - 6. Field quality control.
 - 7. Final cleaning.
 - 8. Coordination with other work.
 - 9. Final approval of finishes will be made from benchmark samples.
- C. Coordination: Coordinate related trades for installation of the Work. Advise brick and plaster trades on proper cleaning and protection of their materials for successful application of graffiti-resistant coating.
- D. Test Panel Mock-ups:

1. Before proceeding with full-scale application, review manufacturer's product data sheet to determine the suitability of product for the specific surfaces. Apply coating to test panel at the jobsite to determine number of applications, coverage rates, compatibility, effectiveness, surface preparation, application procedures, and desired results.
2. Apply graffiti-resistant coating to test panels in accordance with manufacturer's written instructions. Allow 48 hours or until test panels are thoroughly dry before evaluating final appearance and results. Do not begin full-scale application until test panels are approved by the Architect and Owner.
3. Test Panel Requirements:
 - a. Size: Minimum 4- x 4-feet each, or as determined by Architect and Owner.
 - b. Locations: As determined by Architect.
 - c. Number: as required to completely test each coating application method with each type of substrate to be protected.
4. Retain and protect test panels approved by the Architect in undisturbed condition during the work of this Section for use as a standard for judging the final graffiti-resistant coating work.

1.5 WARRANTY

- A. Warrant graffiti-resistant coatings to be free from defects in material, fabrication, and installation. Graffiti-resistant coatings shall continue to repel graffiti after repeated cleaning during the warranty period.
 1. Defects are defined to include failure to withstand complete graffiti removal, ghosting, shadowing, chemical staining, yellowing, and normal environmental effects.
 2. This warranty shall be in addition to and not a limitation of other rights the City may have against the Contractor under the Contract Documents.
 3. Warranty Period: 10 years from date of Project Acceptance.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide graffiti-resistant coating system complying with the following:
 1. Graffiti-resistant coating systems shall be compatible and approved by manufacturer for material and application.
 2. Permanent coating system. Coating shall not require re-application regardless of number of graffiti taggings during the life of the 10-year performance warranty period.
 3. Show no signs of deterioration or change of appearance after graffiti removal during the warranty period. No ghosting, staining or shadowing.
 4. Capability of removing 100-percent of all types of paint and graffiti materials from treated surfaces without damaging the coating or the substrate.
 5. Upon graffiti removal, no evidence of graffiti shall remain.
 6. Capable of withstanding a minimum of 120 cleaning cycles over the same area without measurable coating deterioration.
 7. Shall not increase dirt pick-up of substrate.
 8. Meet the following test results for the following chemicals:
 - a. MEK No effect after 5-days.

- b. Carboxylic Acid No effect after 5-days.
 - c. 75% Phosphoric Acid No effect after 5-days.
 - d. 37% HCL 3 hours blister.
 - e. 50% Sulfuric Acid No effect after 5-days.
 - f. 20% NIT 68 hours blister.
- B. Time-Tested:
- 1. Graffiti resistant system shall have been in successful commercial use for at least 12-years.
 - 2. Furnish documentation of performance of the graffiti-resistant coating system by written report from a nationally recognized and certified protective coating specialist. Documentation shall include type of substrate, location, length of service, testing performed and results.

2.2 MATERIALS, GENERAL

- A. Material Characteristics: ASTM D6578/D6578M; and the following:
- 1. Silicone elastomer graffiti control coating.
 - 2. Compliant with California VOC regulations.
 - 3. Clear, single component.
 - 4. Non-yellowing.
 - 5. Non-glossy penetrating liquid forming a durable invisible barrier.
 - 6. Specifically designed for porous masonry and plaster to provide protection against water and waterborne staining.
 - 7. Vapor permeable.
 - 8. Non-sacrificial type coating.
 - 9. Efflorescence-inhibiting.
- B. Material Quality: Provide manufacturer's best-quality material for each coating material specified.

PART 3 - EXECUTION – NOT USED

3.1 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Obtain the services of a manufacturer's authorized field representative to verify protection, surface preparation, and application of graffiti-resistant coatings are in accordance with the manufacturer's written instructions and the test panel results approved by the Architect and Owner.
- B. The City Representative reserve the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coatings are being applied:
- 1. City Representative will engage the services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of the Contractor.
 - 2. Testing agency will perform appropriate tests for the following characteristics as requested by the City Representative:
 - a. Quantitative materials analysis.
 - b. Absorption.
 - c. Accelerated weathering.

- d. Accelerated yellowness.
 - e. Alkali and mildew resistance.
 - f. Abrasion resistance.
 - g. Washability.
3. City Representative may direct Contractor to stop applying coatings if test results show materials being used do not comply with specified requirements. Remove non-complying coating materials from the Project site, pay for testing, and recoat surfaces coated with rejected materials. If necessary, remove rejected materials from previously coated surfaces if, on recoating with specified materials, the two coatings are not compatible.

3.2 DEMONSTRATION

- A. Demonstration: Apply alkyd-based graffiti to a 2-foot square treated area selected by the Architect. Allow graffiti to remain on surface for a minimum of 5-days and demonstrate complete removal in the presence of the Architect and Owner.

END OF SECTION 09 96 23

SECTION 09 97 29 – CONCRETE FLOOR SEALING

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 SECTION INCLUDES

- A. Concrete floor sealer/hardener.

1.3 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete: Procedures for curing concrete.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Experience in the production and use of the product specified. Supply a list of projects where specified products have been used on similar projects with similar jobsite and exposure conditions.
- B. Contractor Qualifications: Minimum five years prior experience with the use and application of the specified materials or similar products.
- C. Pre-Installation Conference: Conference shall be attended by Contractor, Owner, Architect, sealer subcontractor and his foreman. Review procedures, materials, techniques, and coordinate related work and shutdowns.
- D. Mock-up: Before applying curing and sealing compound to entire surface, test a small area to verify that product is providing the desired moisture retention, penetration ability and finish appearance (sheen).
 - 1. Test a minimum 4 ft. by 4 ft. area on selected area of concrete. Use the manufacturer's application instructions. Let test area protective treatment cure before inspection. Keep test area available for comparison throughout the protective treatment project.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Product: High solids, solvent based, non-yellowing, acrylic copolymer concrete curing, sealing and dustproofing compound.
 - 1. Meeting the applicable requirements of ASTM C1315 Type 1, Class B; ASTM C309; AASHTO M-148.
 - 2. VOC Content: 0 g/l.
 - 3. Gloss: Low sheen.
 - 4. Coefficient of Friction: 0.5 or better.

- B. VOC Content: Coatings applied on-site on the interior of the building and products used on the interior of the building shall comply with VOC limits as specified in Section 01 8113 - Sustainable Design Requirements.
 - 1. Use materials that have the lowest possible VOC content in units of g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Coatings: Meet the following:
 - a. EPA Method 24 testing of less than 40 g/liter
 - b. Contains no formaldehyde, formaldehyde precursors and zero-carcinogens
 - c. Contains zero hazardous air pollutants (HAP's)

- C. Product: High solids, solvent based, non-yellowing, acrylic copolymer concrete curing, sealing and dustproofing compound.
 - 1. Meeting the applicable requirements of ASTM C1315 Type 1, Class B; ASTM C309; AASHTO M-148.
 - 2. VOC Content: 0 g/l.
 - 3. Gloss: Low sheen.
 - 4. Coefficient of Friction: 0.5 or better.

PART 3 - EXECUTION

3.1 CONCRETE CURING

- A. Curing Freshly Placed Concrete: Cure surfaces in accordance with ACI 308. Surface must be finished and show no surface sheen from moisture. Verify surface is able to withstand walking workmen.

END OF SECTION 09 97 29

SECTION 10 11 00 – VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Tackboards.
- B. Magnetic glass markerboards.
- C. Locations: see Building Summary.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of visual display surface through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of visual display units and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- C. Fire-Test-Response Characteristics: Provide fabrics with the surface-burning characteristics indicated, as determined by testing identical products per ASTM E84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Provide anchorage of display cases capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."
- B. Surface-burning characteristics: Comply with ASTM E 84; testing by a qualified testing agency, identify products with appropriate markings of applicable testing agency.
 - 1. Flame Spread Index: 25 or less
 - 2. Smoke-Developed Index: 450 or less

2.2 WALL-MOUNTED TACKBOARDS

- A. Basis-of-Design: Forbo Bulletin
 - 1. Location: See building summary.
 - 2. Size: Align top and bottom of tackboard with project datums.

- B. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; of size and shape indicated.
 - 1. Factory-Applied Trim: Manufacturer's standard.
- C. Natural-material Tackable Assembly: 1/4-inch- (6-mm-) thick, homogenous tackable surface materials made of primary natural materials consisting of linseed oil, cork, rosin binders and dry pigments mixed and calendered onto a natural jute backing. Uni-color extends throughout the thickness of the material
 - 1. Gauge: 1/4"
 - 2. Backing: Jute
 - 3. Meets or exceeds all technical requirements as set forth in ASTM F2034
 - 4. Compliant with CHPS 01350 requirement for VOC emissions and indoor air quality
 - 5. Flexibility: will not crack or break when bent around a 2-3/4" diameter cylinder
 - 6. Sound Testing: NRC 0.10 when tested in accordance with ASTM C423. Standard Test Method for Sound Absorption & Sound Absorption Coefficient by the Reverberation Room Method; Sound Absorption Average (SAA) is 0.09 when test in accordance with ASTM C423, Standard Test Method for Sound Absorption & Sound Absorption Coefficient by the Reverberation Room Method
 - 7. Resistance to Bacteria: self-sanitizing in the form of a bactericidal effect
 - 8. Anti-static properties: naturally anti-static.
 - 9. Fire testing: Class B when tested in accordance to ASTM E84/NFPA 255, Standard Test Method for Surface Burning Characteristics

2.3 PROJECTABLE MAGNETIC GLASS MARKER BOARD

- A. Basis-of-Design: Bendheim Mag+ Projectable Magnetic Dry-Erase Glass Markerboard
 - 1. Location: See building summary.
 - 2. Size: Align top and bottom of tackboard with project datums.
- B. Characteristics:
 - 1. Single sided projectable magnetic dry-erase glass marker board.
 - 2. Thickness: 5/16-inch.
 - 3. Laminated safety glass.
 - a. meet requirements for ANSI Z97.1 & the Consumer Product Safety Commission CPSC 16FR, part 1201 – Safety Standard for Architectural Glazing Materials
 - b. Safety film is not acceptable as alternative to tempered or laminated glass.
 - 4. Magnetic: Magnetic Finish
 - 5. Frame: Frameless
 - 6. Mounting Style: Bendheim Z-Kiss, concealed hardware and anchors
 - 7. Color: custom color to match Architect's sample approved by Owner.
- C. Provide one full box of rare earth magnets for use with each glass marker board.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 10 11 00

SECTION 10 14 00 – SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Scope of work includes all exterior and interior code signage and exterior wayfinding signage as described in the design criteria documents. The DBE is responsible to meet any and all local, state and federal code requirements when fabricating and installing signs to include but not limiting to: American with Disabilities Act (ADA), California Code of Regulations, City of Gonzales Building Department, Authority Having Jurisdiction (AHJ) and Fire requirements.
- B. Perform all work necessary to complete and install all signage and graphic components including supports and mounting hardware. Work shall include obtaining all necessary permits from applicable agencies including paying all fees, making adjustments as required for approval by AJH and proper execution of the Work.
- C. Quotes shall be inclusive of all requirements of this specification and general terms and conditions of the building construction contract. Include all taxes, storage, delivery, install and other requirements.
- D. References
 1. Americans with Disabilities Act (ADA) legislation, published in the Department of Justice Federal Register.
 2. Title 24, California Code of Regulations (CCR), maintained by the California Building Standards Commission (CBSC)
 3. American Welding Society (AWS); AWS D1.1 "Structural Welding Code, Steel", and AWS D1.2 "Structural Welding Code, Aluminum".
 4. National Association of Architectural Metal Manufacturers (NAAMM): "Metal Finishes Manual".
- E. City of Gonzales Signage guidelines

1.3 SECTION INCLUDES

- A. Exterior code-required signage including but not limited to:
 1. Building Identification, Address Sign
 2. Building accessibility signage.
 3. Dimensional characters.
 4. Parking stall accessibility symbols and signs.
 5. Electric vehicle parking signs.
 6. Unauthorized vehicle signs.
 7. Building information signage.

8. No smoking signage.
9. Tactile Room Identification Signage
10. Tactile Egress Signage- Exit & Exit Route Signs
11. Code Signage required by Authority Having Jurisdiction.

- B. Interior code required signage, including but not limited to:
 1. Directional signage, including Tactile Egress Signage- Exit, Exit Route signs.
 2. Tactile Restroom wall signage.
 3. Restroom Door Signage
 4. Wall-mounted blade signage for Fire extinguishers and AED.
 5. Tactile Room Identification signs.
 6. Assistive Listening Devices
 7. Life-safety signage.
 8. Code Signage required by Authority Having Jurisdiction.
- C. Exterior wayfinding signage, see design criteria drawings and narratives.
 1. Digital monumental site sign at driveway (size to be determined, but digital content must be legible for vehicular traffic along 5th Street)
 2. Complex entrance sign – “Gonzales Community Center” (suspended, soffit-mounted, with illuminated pin letters)
 3. Complex directory (freestanding at entry to complex, with integrated lighting) with site map showing indoor and outdoor complex amenities
 4. Wayfinding signs (exterior wall or canopy-mounted, with illuminated pin letters) for:
 - a. Library
 - b. Teen Innovation Center
 - c. Community Hall
 - d. Fitness Center

1.4 STANDARDS

- A. Provide sign types of the size, material, images and arrangements made up of special and standard components and construction required per Authority Having Jurisdiction.
- B. DBE shall verify sign and copy length for proper fit and shall notify state in writing of any discrepancies in the documents prior to fabrication.
- C. All materials shall be new stock, free from defects impairing strength, durability and appearance.
- D. All fabrication and installation shall be in accordance with highest standards of the trade. All signs and components shall be complete and free from visual and mechanical defects. (Such as unfilled and unfinished seams or exposed fasteners).
- E. All electrical work must comply with UL standards, National Electrical Code (NEC) requirements, and local jurisdictional requirements.
- F. No fabrication or installation materials or procedures shall be used that will in any way change the visual quality or in any manner have an adverse effect on existing materials and surfaces.

- G. The DBE shall be responsible for the quality control of all text. All letterforms shall be crisp, sharp and free of nicked edges and discontinuous curves. All lettering shall conform to approved typeface, weight and letter spacing. No substitutions of typeface foundry or version shall be accepted.
- H. All damaged signing surfaces and materials incurred shall be restored to original condition and appearance or replaced by the DBE.
- I. All copy to be Braille, shall be Grade 2 Braille to match the performance and use specifications of Title III of the Americans with Disabilities Act, Public Law 101-336. It shall be the responsibility of the DBE to verify accuracy of all Braille messages.

1.5 RELATED SECTIONS

- A. Division 26 – Electrical for electrical connections to lighted signage.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Maintenance Instruction: Furnish maintenance manual to instruct the Owner in procedures to be followed in cleaning and maintaining the signage. Provide manufacturer's brochures describing the actual materials used in the Work, including metal alloys and finishes.
- B. Include a list of cleaning materials appropriate for continued cleaning of signs. Include written instructions for proper maintenance, service access, replacement procedures, etc. Include recommended methods for removal of residual adhesives from wall surfaces and glazing after removal of adhesive mounted signs.
- C. Extra Materials: Deliver to the Owner in manufacturer's original packaging and store at the project site where directed.
 - 1. Furnish one quart of each finish paint color for touch-up purposes.

1.7 REGULATORY REQUIREMENTS

- A. Off-Street Parking Space Identification:
 - 1. Entry Drive Accessibility Notification: As indicated on Drawings.
 - 2. Disabled Parking Spaces: Identify each parking space with a permanently affixed reflectorized sign on a post immediately adjacent to and visible from each space, graphics as indicated on Drawings.
 - 3. Signage Size: As indicated on Drawings.
 - 4. Van-Accessible Signage: As indicated on Drawings.
 - 5. EV Charging Stations: As indicated on Drawings.
- B. CBC and ADA Requirements: Compliance applies to interior signage, including Braille lettering.
- C. Provide signage at toilet rooms.
- D. Provide signage at unit entry doors, 1/4-inch raised metallic unit number (polished chrome finish) with ADA compliant braille on 1/4-inch thick plaque below, finished to match numbers.

- E. Signage to be posted at all entry doors to building with 3" tall "No Smoking" pictogram at top followed by:
- F. Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
 - 1. Interior Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction.

1.8 QUALITY ASSURANCE

- A. Contractor shall have experienced and certified signage installers with a minimum of 5 years' experience installing signage and regularly engaged in installing signage work of the same type required for this project. Installer certification is required to install signs which include but not limited to electrical work, welding, and crane truck operation. Installers shall be skilled tradesmen who are thoroughly experienced with the materials and equipment to be used in the Work. Installation shall be supervised by a field supervisor with minimum 10 years' experience.
- B. Full Size Layouts: After review of finish samples and shop drawings, furnish full size layouts of each sign type before proceeding with final fabrication of the Work.
- C. In-progress Fabrication Review: Architect and Owner shall review specified signs during the fabrication process at fabricator's shop if located locally to Architect and or Owner. If fabricator is not geographically accessible, fabricator shall provide appropriate in progress documentation in the form of photographs and/or video.
- D. Pre-installation Conference: Prior to commencing installation of the Work and at the Contractor's direction, meet at the project site to review the material selections, the field samples, installation procedures and coordination with other trades. Meeting shall include the Contractor, Installer, Architect, Owner, manufacturer's representatives, and any trade that requires coordination with the Work. Record meeting minutes in writing any oral instructions, and whether Contractor and Installer agree that the proposed installations are likely to perform as required.
- E. Regulatory Requirements: Comply with applicable requirements of the laws, codes, Americans with Disability Act (ADA), ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from all such authorities. The most stringent of applicable codes shall be used for the project.
- F. Trade Names: Do not display manufacturer's name, trade name, trademarks or similar markings on exterior or visible surfaces.
- G. UL Compliance: Provide lighting fixtures and electrical components which are UL-labeled and listed.
- H. Sign Quantity Count: Contractor shall be responsible for determining the final quantity count of all signs, as indicated on the Copy Schedule and Drawings, prior to fabrication. Quantities shown on the Sign Schedule are preliminary sign count estimates, to be used for preliminary budget estimates only. Contractor to verify signage quantities.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials, fabrication or installation within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.
- B. Finishes Warranty: Submit five-year written warranty, signed by the Contractor and Installer, warranting that the architectural signage finishes will not develop excessive fading or excessive non-uniformity of color or shade and will not crack, peel, pit or corrode or otherwise fail as a result in defects or workmanship, within the following defined limits. Upon notification of such defects, within the warranty period, make necessary repairs or replacement at the convenience of the Owner.
 - 1. "Excessive Fading": A change in appearance which is perceptible and objectionable as determined by the Designer when visually compared with the original color range standards.
 - 2. "Excessive Non-Uniformity": Non-uniform fading during the period of the guarantee to the extent that adjacent panels have a color difference greater than the original acceptable range of color.
 - 3. "Will Not Pit or Otherwise Corrode": No pitting or other type of corrosion discernible from a distance of 10'-0", resulting from the natural elements in the atmosphere at the project site.
- C. Replacement or Repairs: The Owner shall have the right to continue use of the defective part until such time that the part is replaced or repaired without loss or inconvenience to the Owner. Warranties shall also state that the replaced or repaired part shall have a warranty period equal to the remaining warranty period for the replaced or repaired part plus an additional one year.

PART 2 - PRODUCTS

2.1 AESTHETIC REQUIREMENTS

- A. Copy shall be straight with letters properly spaced with typefaces accurately reproduced with square corners and even curves, letters and symbols uniform, and edges straight and true.
- B. Finishes shall be smooth and with no visible imperfections.

2.2 TYPOGRAPHIC REQUIREMENTS

- A. Type used shall be specified in the contract documents.
- B. Lettering shown on the drawings is intended as a guideline for layouts, type size and copy to be provided on individual signs, and is based on scale calculations of the message length within given and estimated sign areas. Notations contained within parenthesis () in the copy schedule of signs are instructions for logos or symbols that are to be included on the

sign, as shown on the design drawings. Refer to the copy schedule of signs for copy, quantities, description of signs and reference to sign locations.

- C. Spelling and punctuation shall be correct. Should an error in spelling or punctuation be found, or the spelling appears questionable, notify the Architect and Owner.
- D. Align letter forms to maintain a baseline parallel to the sign format. Maintain margins as indicated in sign layouts.

2.3 MATERIALS, GENERAL

- A. General: Fabricate sign plates of the size, thickness and configuration indicated. Precision engrave the required letters, numbers or figures with uniform margins, in the letter style and size indicated, or as selected by the Architect and Owner from the manufacturer's standard fonts.
 - 1. Protect finished metal surfaces with 2 coats of clear, non-yellowing lacquer.
 - 2. Finish and Contrast. The characters and background of signs shall be eggshell, matte, or other non-glare finish.
 - 3. Characters and symbols shall contrast with their background –either light characters on a dark background or dark characters on a light background.
- B. Exterior Signage: Complying with ADA, 18 gage bonderized steel screen painted blue with white international disabled symbol.
- C. Interior Signage: Cast acrylic sheet, transparent, clear, semi-matte or non-glare, 0.125-inch thick, frameless signs, color TBD.
- D. Uncoated Monolithic 'Ecoresin' Sheets: ASTM D4812 for impact resistance and as follows:
 - 1. Smoke Density Rating: ASTM D2843, 75 percent maximum allowable.
 - 2. Combustion Rating: ASTM D635; CC1 rating (burn less than 1-inch minimum).
 - 3. Self-Ignition Temperature: ASTM D1929; 650 degrees F minimum.
 - 4. Surface Burning Characteristics: ASTM E84; Class B:
 - a. Flame Spread: 75 maximum.
 - b. Smoke Generated: 450 maximum.
- E. Pictograms, General:
 - 1. Pictograms (where provided) shall be accompanied by the equivalent verbal description placed directly below the pictogram. Pictograms are figures that depict what the words are stating.
 - 2. The border dimension of the pictogram shall be 6 in (152 mm) minimum in height (i.e. graphics enclosed within a maximum 6-inch square border).
- F. Applied Copy: Die-cut characters from vinyl film of nominal thickness of 1/32-inch with pressure-sensitive adhesive backing. Apply copy to exposed face of sign.
- G. Tactile and Braille Copy: Manufacturer's standard process for producing copy complying with 2019 CBC Section 1117B.5.6 requirements. Text shall be accompanied by Contracted Grade 2 Raster Braille. Produce precisely formed characters with square cut edges free from burrs and cut marks.
 - 1. Panel Material: Frosted acrylic sheet, aluminum sheet, stainless steel sheet as indicated on Drawings.

2. Raised Characters: At least 5/8 in (16 mm) high, but no higher than 2 in (50 mm).
 3. Raised Letters and Numerals: 1/32 in, upper case, SANS SERIF or SIMPLE SERIF type
 4. Characters: 1/10-inch is required between each dot within a cell, measured from the dot centers. 2/10-inch is required between each cell within a word. Measure from the center of the dots in the second column of the first cell to the center of the dots in the first column of the next cell. Dots must be a minimum of 1/40-inch high at the apex.
- H. Colored Coatings for Acrylic Sheet: For copy and background colors, provide Pantone Matching System (PMS) colored coatings, including inks and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are non-fading for application intended.
- I. Symbols of Accessibility: Provide 6-inch- (150-mm-) high symbol fabricated from opaque non-reflective vinyl film, 0.0035-inch (0.089-mm) nominal thickness, with pressure-sensitive adhesive backing suitable for both exterior and interior applications.

2.4 SIGN MATERIALS

A. Metal:

1. General: For the fabrication of exposed metal work, use only materials which are smooth and free of surface blemishes including pitting, roughness, seam marks, roller marks and trade names. Do not use materials which have stains and discoloration.
2. Aluminum / Cabinet / Extrusion Manufacturer: SignComp or similar.
3. Aluminum: Provide Aluminum Association Alloy 6063T5 or 6061T6 or as recommended to suit required service and finish.
4. Aluminum Extrusions: Provide the specific alloy and temper recommended by aluminum producer or finisher for type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 221 for 6063-T5.
5. Fasteners, Hardware and Devices: Stock proprietary fastening devices of approved standard manufacture such as cadmium plated screws, bolts and washers, and stainless-steel hinges.
6. Welding Electrodes and Filler Metal: Provide the alloy and type required for strength, workability, compatibility and color match after grinding smooth and finishing the fabricated product.

B. Acrylic:

1. General: Edges shall be square to face and free from saw marks and chips. Edges shall be smooth and flame polished unless otherwise indicated. Use protective coating when acrylic is within reach of public or is being used for exterior applications. Refer to sign drawings for specific coating recommendations.
2. Acrylic Manufacturer: 3form, Acrylite, DuPont.
3. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet with a minimum flexural strength of 16,000 psi, when tested in accordance with ASTM D790, minimum allowable continuous service temperature of 180 degrees F (82 degrees C); in sizes and thickness indicated; and in the following general types:
4. Transparent Sheet: Where indicated as "clear" provide colorless sheet with light transmittance of 92%, when tested in accordance with ASTM D1003, in semi-matte finish, unless otherwise indicated.

5. Opaque Sheet: Where indicated as "opaque" provide colored acrylic sheet in colors and finishes indicated, or if not indicated as selected from manufacturer's standards.
6. Colored Coating for Acrylic Plastic Sheet: Use colored coatings, including inks and paints for copy and background colors, which are recommended by the acrylic manufacturer for optimum adherence to acrylic surfaces and are non-fading for application indicated.
7. Vinyl Film: Non-reflective vinyl film, 0.0035" minimum thickness with pressure sensitive adhesive backing suitable for exterior as well as interior applications. Colors shall be integral and not surface applied. Paints, inks, dyes, and other materials used in the process shall be compatible and guaranteed not to cause discoloration, deterioration or delamination.
8. Translucent vinyl to be used on illuminated signs and Opaque vinyl to be used on non-illuminated signs, as specified. Vinyl colors to be matched to Pantone Matching System (PMS) colors as specified on design drawings; vinyl color samples to be submitted to the Architect and Owner for final approval prior to fabrication.
9. Pre-spaced die-cut letters supplied in specified typeface, color, and spacing with a quick release, backing sheet.

C. Wood:

1. All materials and fabrication of all work shall comply with the "Premium Grade" requirements of Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute (AWI).
2. Provide samples of specified materials as shown on drawings or to match Architect's samples approved by Owner.
3. Factory finish on all materials shall match Architect's sample approved by Owner.
4. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.

D. Wood Veneer and Finish: See section 06 41 00 Architectural Woodwork.

E. Miscellaneous Materials:

1. Provide adhesive, sealant, and other necessary materials as best suited for the purpose.

2.5 PANEL SIGN COMPONENTS

A. General:

1. Panel signs to comply with requirements indicated for materials, thickness, finishes, colors, designs, shapes, sizes and details of construction.
2. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions.

B. Panel Signs: Panel signs mechanically and smoothly finished to conform with the following requirements:

1. Corner Condition: See design drawings
2. Edge Condition: See design drawings

C. Subsurface Graphic Panel/Plaque: Sign Copy is applied to front surface of non-glare, acrylic plastic; thickness as specified on design drawings or construction details. Opaque paint/digital print is applied to back. All inks used to be acrylic lacquer. Digital material substrate specified on design drawings

- D. Cut-out Letters and Numbers: Cut aluminum or acrylic letters to have precisely cut characters with square cut, smooth edges.
- E. Graphic Image Process:
 - 1. Graphic Content and Style: Provide sign copy to comply with requirements indicated for sizes, styles, spacing, content, positions, materials, finishes and colors of letters, numbers, symbols and other graphic elements.
- F. Etched Copy (in metal): Photographically precise artwork (letters, numbers, symbols, logos) etched into metal panel indicated to produce precisely formed copy, incised to a uniform depth of at least 1/32". A photo-resist (or "graphic" resist) process shall be used. No hand cutting of stencils, templates, etc. will be acceptable in the production of letterforms. Fill incised copy with gloss enamel to match indicated colors.
- G. Silkscreen: All silkscreening to use Nazdar, fast drying enamel silkscreen ink. Ink to be totally opaque and matte color not limited to manufacturer's standard colors. Silkscreen mesh to be 390 or finer.

2.6 DIMENSIONAL CHARACTERS

- A. Aluminum Extrusions: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of 6063-T5.
- B. Cutout Characters: Cut characters using water jet process from solid plate of thickness and metal indicated. Produce precisely cut characters with square cut, smooth edges. Comply with requirements indicated for finish, style, and size.
 - 1. Metal: Aluminum.
 - 2. Finish: Painted as reviewed by Architect and Owner. See G-Series Drawings.
 - 3. Character Height: 14 inches minimum or as indicated on approved shop drawings.
 - 4. Character Style: To be selected.
 - 5. Provide electrical feed for backlit signs.
- C. Water Jet Cutting: Use CNC Water Jet Cutting process and as follows:
 - 1. Use high speed jet of pressurized water with garnet abrasives, of pressure required to achieve clean, accurate, precise cuts of patterns indicated in aluminum of thickness indicated.
 - 2. Maintain flatness of material. Warping due to cutting will be cause for rejection of the panel.
 - 3. Remove any burrs that may remain after cutting is complete, grinding or sanding if necessary to produce a smooth, finished panel.

2.7 ACCESSORIES

- A. Mounting Methods: Use concealed fasteners or silicone adhesive fabricated from materials that are not corrosive to sign material and mounting surface.
- B. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

- C. Dimensional Character Fasteners:
 - 1. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

2.8 FINISHING MATERIALS

- A. Polyurethane Coatings: Provide the following, or other products as acceptable to the Architect and Owner.
- B. Acrylic Polyurethane Enamel: two-component, acrylic modified, aliphatic polyurethane enamel having UV inhibitors and engineered for application to signage components. Gloss sheen of 90+/- five units at 60 degrees. Flat sheet of 10+/- five units at 60 degrees. Matthews Paint Co. "Series 40 Matthews Acrylic Polyurethane"
- C. Silkscreening Materials: Provide photo processed screening, arranged to furnish sharp and solid images without edge build-up or bleeding of the coating. Pattern-cut screens may be used for non-repeat copy, provided that final image copy is equal to photoscreen quality. Provide only weather-resistant coating materials, compatible with the intended substrates.
- D. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, surface imperfections will not be acceptable.
- E. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface finish or even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
- F. Provide satin finish for final coats, unless otherwise indicated.

2.9 FINISHES

- A. Colors and Surface Textures: For exposed sign materials which require selection of materials with integral or applied colors, surface textures of other characteristics related to appearance, provide color matches indicated, or if not otherwise indicated, as selected by Architect and Owner from manufacturer's standard.
- B. Metal Finishes: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations. Protect mechanical finishes on exposed surfaces from damage by application of strippable temporary protective covering prior to shipment.
- C. Painted Finishes: Surfaces under painted finish to be smooth, clean and free of dust, grease, fingerprints or other foreign matter. If necessary, to obtain true color application, surface to be "primed" with white before final color is applied. Artwork to be accurately reproduced with all edges straight and true and all finishes smooth and with no visible imperfections.

2.10 FABRICATION OF SIGNS AND SUPPORTS

- A. General: Provide custom manufactured sign assembled components completely fabricated and finished at factory before delivery to site. Construct to accurate detail and dimensions as shown and as reviewed on shop drawings. Fit and assemble the work at shop to the

greatest extent possible, and mark the components as required to facilitate assembly during installation.

- B. All fabrication shall be executed in such a manner that all edges and corners of finished letterforms and signs and substrates are true and clean. Letterforms and signs with rounded positive and negative corners, nicked, cut or ragged edges bent or distressed edges, etc. shall not be accepted.
- C. All finishes shall be executed in such a manner that all surfaces shall have a smooth even finish and are free of any and all irregularities.
- D. All letterforms should be cut and routed in a manner to produce true and clean edges and corners. Letterforms shall be so aligned as to maintain a baseline parallel to the sign format. Margins shall be maintained as specified by sign type layouts. Exposed Fasteners: Exposed fasteners on finished faces will not be allowed, unless specifically indicated. When exposed fasteners are used, finish the fastener to match the color and texture of surrounding materials
- E. All edges of letterforms shall be sharp and clean with no edge buildup or bleeding. All surfaces of letterforms shall be without pinholes.
- F. Sheet metal letterforms and other items shall be cut from rolled sheet of specified gauge, all edges of copy to be perpendicular to copy face, ground smooth and polished to finish as noted on drawings and schedules. No surface deflection, “oil-canning” or warping will not be accepted.
- G. All engraving shall be computerized CNC engraving systems. Engraving shall be uniform depth of 1/32” with no visible tooling marks.
- H. Preparation, primer and semi gloss polyurethane acrylic base finish coats to provide weather-resistant finish guaranteed for 5 years against pitting, peeling, or fading. Polyurethane coating provided for use on surfaces shall have properties of moisture resistance in all weather conditions and shall be guaranteed for 5 years against pitting, peeling or fading.
- I. No paints that will fade, discolor, or de-laminate as a result of ultraviolet light or heat shall be used.
- J. All paints required for lettering shall be a type made for the surface material on which it is applied and recommended by the manufacturer of the paint. Exact identification of all paints shall be noted on shop drawings, together with data describing the method of application and curing, if other than “air” drying.
- K. All paints shall be evenly applied and without pinholes, orange peeling, scratches, application marks, and other imperfections. Workmanship in conjunction with finishes of signage shall conform to the highest standards of the trade.
- L. Primer coats or other surface pretreatments, where recommended by the manufacturer for paints, shall be included in the work as part of the finished surface work at no extra cost to the City.

- M. All adhesives as may be required shall be used in accordance with recommendations made by the manufacturer of the material specified to be laminated or adhered. No adhesives that will fade, discolor or de-laminate as a result of ultraviolet light or heat shall be used and shall not change the color of or deteriorate the materials to which they are to be applied. The adhesives shall be of a non-staining, non-yellowing quality and all visible joints shall be free from air bubbles and other defects.
- N. For the fabrication of general metal work which will be exposed to view, use only material which are smooth and free of surface blemishes including pitting, roughness, seam marks and trade names. Unless the surfaces are to be painted, do not use materials that have stains and discolorations.
- O. For exposed items of work that include plain flat surfaces in width of more than 50 times the metal thickness, provide sheet stock from the mill that has been stretcher leveled to the highest standard of flatness commercially available.
- P. Seamless Construction: All sign surfaces and edges to be seamless unless specifically indicated.
- Q. Illumination: Provide manufacturers standard lighting provisions using only UL approved electrical components at 120 volts. Provide disconnect switch and make provision for servicing lamps and other components. The minimum brightness ratio between the illuminated letter and the sign face shall be 30 to 1, assuming an ambient lighting level of 10 foot candles. The maximum variation in brightness between any two points on the copy shall be 5 percent. Color of lighting shall be warm white.
- R. LED Lighting: Provide GE Tetra LED Series lighting or equal. Lamps shall meet all applicable Federal and State requirements. All illuminated signage shall be dimmable. Provide dimming module compatible with LED lighting system. Provide means to easily access manual dimmer switch discreetly located on sign.
- S. Metal Signs and Supports: Fabricate exposed surfaces uniformly flat and smooth, without distortion, pitting or other blemishes. Form exposed metal edges to a smooth radius. Permanently bond the laminated metal components and honeycomb core with adhesive or sealant in accordance with product manufacturer's recommendations. Grind exposed welds and rough areas to make flush with adjacent smooth surfaces.
- T. Welding: Make welds continuous. Comply with American Welding Society, Aluminum Association, and Copper Development Association standards for the type of metal. Welding, when necessary, shall be of the correct type to minimize permanent distortions of flat surfaces. All welding flux, oxides and discolorations must be removed by pickling or grinding, so that these areas match finish of the adjacent areas. Any damage caused by welding must be repaired by grinding, polishing or buffing.
- U. Fasteners: Use exposed fasteners only where indicated. Perform drilling and tapping at shop.
- V. Dissimilar Materials: Where metal surfaces will be in contact with dissimilar materials, coat the surfaces with epoxy paint or provide other means of dielectric separation as recommended by manufacturer to prevent galvanic corrosion.

2.11 SHOP APPLICATION OF SIGN FINISHES

- A. Sign Graphics: Provide the letters, numerals, symbols, and other graphic markings, using the finish materials indicated. Apply the graphics neatly, uniformly proportioned and spaced, and accurate within dimensions indicated. Prepare the substrate surfaces and apply finish materials in accordance with manufacturer's instructions.
- B. Polyurethane Finishes: Clean the surfaces as required for proper adhesion of coatings. Use 3M Company "Scotch Brite" pads with cleanser and water, and/or chemically treat as recommended by paint manufacturer to remove deleterious film or residue.
- C. Primer: Provide in strict accordance with paint manufacturer's recommendations as required for proper adhesive and application of finish.
- D. Acrylic Polyurethane Enamel: Apply in 2.0 mils (0.050mm) dry film thickness as recommended by manufacturer. Color and sheen to match Designer's selection.
- E. Clear Matte Finish: Provide pre-treatment, primer, and matte finish coatings in accordance with manufacturer's recommendations. Apply 1.5 to 2.0 mils (0.0375 to 0.050mm) dry film thickness.
- F. Application of Ink and Paints: "Paint" as used herein means all coating systems, materials, including primers, emulsions, enamels, stains, sealers, and fillers.
 - 1. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied. No paints that will fade, discolor or delaminate as a result of ultraviolet light or heat shall be used.
 - 2. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to ensure that surfaces including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 - 3. Sand lightly between each succeeding enamel or varnish coat.
- G. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pre-treated or otherwise prepared for painting as soon as practical after preparation and before subsequent surface deterioration. Allow sufficient time between successive coatings to permit proper drying. Do not re-coat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

2.12 WEATHER PROOFING

- 1. Water & Humidity: all exterior sign cabinets shall be sealed as to prevent rain water contamination. Proper venting and drainage shall be provided for humid or wet locations for all exterior or interior sign cabinets. All exposed metal surfaces shall be protected from oxidation.
- 2. Heat & Cold: All materials used shall be rated to withstand typical hot or cold conditions associated with the region in which they will be installed.
- 3. Electronics: all electrical connections and electronic components in exterior signs shall be properly sealed or protected from damage by local weather conditions including heat, cold and water. Electronic components that produce or radiate heat shall be properly vented in accordance with the manufacturer's guidelines. Select

equipment that is rated to withstand typical environmental conditions associated with the region or location in which it will be installed.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 10 14 00

SECTION 10 21 13 - SOLID SURFACE TOILET COMPARTMENTS

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 SECTION INCLUDES

- A. Solid surface toilet partitions and sight screens, overhead-braced pilasters, headrail braced.
- B. Additional cross-bracing as required.
- C. Hardware with Non-standard Panel Thickness: Coordinate with items installed under Section 10 28 13 – Commercial Toilet Accessories
- D. Attachments screws and bolts.

1.3 REGULATORY REQUIREMENTS

- A. Conform to ADA and applicable California State Title 24 provisions for the physically handicapped.

1.4 WARRANTY

- A. Provide 25-year limited warranty under provisions of Division 01.
- B. Warranty to provide for coverage of solid phenolic panels, doors and stiles against breakage, corrosion and delamination.
- C. Furnish one-year guarantee against defects in material and workmanship for stainless steel door hardware and mounting brackets.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Graffiti Resistance: Partition material shall have the following graffiti removal characteristics when tested in accordance with ASTM D6578-00 Standard Practice for Determination of Graffiti Resistance in accordance with Section 9, “Graffiti Removal Procedure Using Manual Solvent Rubs”:
 - 1. Cleanability: Five required staining agents shall be cleaned off material.
- B. Scratch Resistance: Partition material shall have the following characteristics when tested in accordance with ASTM D2197-98 (2002) Standard Test Method for Adhesion of Organic Coating by Scrape Adhesion, using Gardner Stock #PA-2197/ST pointed stylus attachment on scrape tester:

1. Scratch Resistance: Maximum Load Value shall exceed 10 kilograms.
- C. Impact Resistance: Partition material shall have the following requirements, when tested in accordance with ASTM D2794-93(1999)e1 Standard Test Method for Resistance of Organic Coating to the Effects of Rapid Deformation (Impact), using .625 inch hemispherical indenter with 2-lb impact weight.
1. Impact Resistance: Maximum Impact Force value shall exceed 30 inch-lbs.
- D. Fire Resistance: Partition material shall comply with the following requirements, when tested in accordance with ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:
1. Smoke Developed Index: Not to exceed 450.
 2. Flame Spread Index: Not to exceed 75.
 3. Material Fire Ratings:
 - a. National Fire Protection Association (NFPA): Class B.
 - b. International Code Council (ICC): Class B.

2.2 MANUFACTURERS

- A. Solid Color Reinforced Composite (SCRC) Partition: Basis-of-Design: Bobrick Washroom Equipment Inc.; www.bobrick.com, **1092G.67P** Sierra Series with the following adjustments:
- a. 1/2-inch panels with 3/4-inch doors.
 - b. Overhead braced with institutional hardware.
 - c. Gap-free privacy design.
 - d. Maximum height privacy with 9-inch floor clearance at bottom of partitions and doors.
 - e. Urinals: Wall hung 1095.
2. Standard Height.
 - a. Door/Panel Height: 58 inches.
 - b. Floor Clearance: 12 inches.
 3. Privacy Style Partitions: No sightlines with gap-free interlocking doors and stiles routed 0.300 inches from the edge to allow for 0.175 inch overlap to prevent line-of-sight into the toilet compartment. Privacy strips fastened or adhered onto the partition material are not acceptable.
 4. Floor-Mounted, overhead-braced with satin finish, extruded anodized aluminum headrails, 0.065 inch thick with anti-grip profile
- B. Solid Color Reinforced Composite (SCRC) Urinal Screens: Bobrick SierraSeries.
1. Mounting Configuration:
 - a. Wall-Hung.
 - 1) Screen Height: 48 inches with 12 inches floor clearance.
 2. Color to match SCRC Partitions.
- C. Materials: Solid color reinforced composite (SCRC) material for stiles, panels, doors, and screens with Bobrick GraffitiOff coating, thermoset and integrally fused into homogenous piece; high density polyethylene (HDPE), high density polypropylene not acceptable.
1. Composition: Dyes, organic fibrous material, and polycarbonate/phenolic resins.
 2. Surface Treatment: Non-ghosting, graffiti resistant surface integrally bonded to core through a manufacturing steps requiring thermal and mechanical pressure.

3. Edges: Same color as the surface.
 4. Color: As selected by Architect and Owner from manufacturer's standard
- D. Finished Thickness:
1. Stiles and Doors: 3/4 inch.
 2. Panels and Screens: 1/2 inch.
- E. Stiles: Floor-Anchored stiles furnished with expansion shields and threaded rods.
1. Leveling Devices: 7 gauge, 3/16 inches thick, corrosion-resistant, chromate-treated, double zinc-plated steel angle leveling bar bolted to stile; furnished with 3/8 inch diameter threaded rods, hex nuts, lock washers, flat washers, spacer sleeves, expansion anchors, and shoe retainers.
 2. Stile Shoes: One-piece, 22 gauge, 18-8, Type 304 stainless steel, 4 inch height; tops with 90 degree return to stile. One-piece shoe capable of adapting to 3/4 inch or 1 inch stile thickness and capable of being fastened (by clip) to stiles starting at wall line.
- F. Anchors: Expansion shields and threaded rods at floor connections as applicable. Threaded rods secured to supports above ceiling as applicable. Supports above ceiling furnished and installed as Work of Section 05 50 00 - Metal Fabrications.

2.3 MATERIALS

- A. Solid Color Reinforced Composite: Composed of dyes, organic fibrous material, and polycarbonate/phenolic resins, with a non-ghosting, graffiti-resistant surface integrally bonded to core.
1. Edges of Material: Same color as the surface.
- B. Headrail: 1 by 1-1/2 inch clear anodized extruded aluminum; antigrip profile, with cast socket type wall brackets.

2.4 HARDWARE

- A. Latch and Keeper:
1. Sliding Door Latch: 14 gauge (2 mm) designed to slide on nylon track and require less than 5-lb force to operate. Twisting latch operation will not be acceptable
 2. Latch Track: Attached to door by machine screws into factory-installed threaded brass inserts.
 3. Threaded Brass Inserts: Factory installed for door hinge and latch connections capable of withstanding a direct pull exceeding 1,500 lbs. per insert.
 4. Use through bolted, stainless steel, pin-in-head Torx sex bolt fasteners at latch keeper-to-stile connections capable of withstanding direct pull force exceeding 1,500 lbs. per fastener.
 5. At compartments designated as accessible, provide pull handle on each side of door centered below latch.
 6. Occupancy Indicators: manufactured from stainless steel housing allows patrons to quickly identify when stalls are occupied. To be installed on all doors. Locking: Door locked from inside by sliding door latch into keeper.
- B. Hinges: All hardware to be 18-8, type-304 stainless steel with satin finish, gravity type hinges, adjustable for door close positioning, nylon bearings.

1. Compliance: Operating force of less than 5 lb.
2. 'Zamac', aluminum, or extruded plastic are not acceptable hardware materials.
3. Cam: Field-adjustable to permit door to be fully closed or partially open when compartment is unoccupied.
4. Hinges: Attached to door and stile by theft-resistant, pin-in-head Torx stainless steel machine screws into factory-installed, threaded brass inserts.
 - a. Fasteners secured directly into the core are not acceptable.
 - b. Emergency Access: Hinges, door latch allow door to be lifted over keeper from outside compartment on inswing doors.
5. Furnish door with two 11-gauge (3-mm) stainless steel door stop plates with attached rubber bumpers to resist door from being kicked in/out beyond stile.
6. Door Stops: Prevents in-swinging doors from swinging out beyond stile; on outswing doors, doorstop prevents door from swinging in beyond stile
7. Secure door stops and hinges with stainless steel, pin-in-head Torx machine screws into threaded brass inserts.
8. Provide threaded brass inserts capable of withstanding a direct pull force exceeding 1,500 lbs per insert.

C. Coat Hook:

1. Coat Hook: Constructed of stainless steel and shall project no more than 1-1/8" (29 mm) from face of door.
2. Secure coat hook to door by through-bolted, theft-resistant, pin-in-head Torx stainless steel screws. Provide through-bolted fasteners capable of withstanding a direct pull force exceeding 1,500 lbs. per fastener.
3. Provide one at each stall, location to be confirmed with Owner.

D. Mounting Brackets:

1. Full-Height.
 - a. Mounting Brackets: 18 gauge stainless steel and extend full height of panel.
 - b. U-Channels: Secure panels to stiles.
 - c. Angle Brackets: Secure stiles-to-walls and panels to walls.

2.5 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

1. Provide overhead braces with sloped and contoured profile that makes them difficult to grip in order to avoid students hanging from partitions.

B. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 34-inch- (863-mm-) wide, clear opening for compartments designated as accessible.

C. Urinal screens:

1. Integral-Flange, Wall-Hung Urinal Screens: Manufacturer's standard thickness, but not less than 0.0269 inch (0.7 mm).

D. Finish Thickness:

1. Partition Panels: 1/2-inch (13 mm).

2. Pilasters: 3/4-inch (19 mm).
3. Stiles and Doors: 3/4-inch (19 mm).

2.6 FINISHES

- A. Solid Color Reinforced Composite Panel Finish:
 1. Facing Finish: One color and pattern in each room.
 2. Color and Pattern: As selected by Architect and Owner from manufacturer's full range, with manufacturer's standard solid color reinforced composite core.
- B. Stainless Steel Surfaces: No. 4 satin finish.
- C. Exposed Steel Surfaces: Polished chrome plated.
- D. Aluminum: Clear anodized.
- E. Non-ferrous Surfaces: Polished chrome plated.

2.7 ACCESSORIES

- A. Plinth: ASTM A666, Type 304 22-gauge (0.8-mm) stainless steel with satin finish, one-piece, 4-inch high, with adjustable screw jack; secured in place with concealed screws and capable of being fastened (by clip) to stiles starting at wall line.
 1. Top shall have 90° return to stile.
- B. Mounting Brackets and Fasteners: Stainless steel.
 1. Mounting Brackets: Mounted inside compartment.
 2. Use through bolted, pin-in-head Torx sex bolt fasteners at locations connecting panels-to-stiles. Provide bolted fasteners capable of withstanding direct pull force exceeding 1,500 lbs. per fastener.
 3. Wall Mounted Urinal Screen Brackets: 11 gauge (3 mm) double thickness.
- C. Leveling Device: 7-gauge, 3/16" (5-mm) hot rolled steel bar; chromate-treated and zinc-plated; through-bolted to base of solid color reinforced composite stile.
- D. Headrail: satin finish, extruded anodized aluminum (.125" / 3-mm thick) with anti-grip profile.
- E. Attachments, Screws, and Bolts: Stainless steel, theft proof type, heavy duty extruded aluminum brackets.
- F. Through Bolts and Nuts: Stainless steel with tamperproof heads.
- G. Steel Plate Reinforcement: Carbon steel, prepared for fasteners, 1/8 inch thick.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 10 21 13

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SECTION 10 22 26 – OPERABLE PARTITIONS

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 SECTION INCLUDES

- A. Operable Partitions: Manually operable, top supported operable wall with panels hinged in groups of two; integrated emergency exit swinging man door with panic hardware.
 - 1. Location: B112: Community Hall

1.3 RELATED SECTIONS

- A. Section 05 12 00 – Structural Steel Framing: Steel carrier beams for operable partition top track.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from the same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Panel Finish-Facing Material: Furnish full width in quantity to cover both sides of two panels when installed.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified in writing by the operable wall manufacturer as qualified to install the manufacturer's partition system for work similar in material, design, and extent to that indicated for this project.
- B. Testing Agency Qualifications: An independent NVLAP-accredited testing laboratory with experience and capability to conduct the testing indicated, as documented according to ASTM E548. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.
- C. Fire-Test-Response Characteristics: Provide panels with finishes meeting one of the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: As determined by testing per ASTM E84.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire Growth Contribution: Textile wall coverings comply with the acceptance criteria of NFPA 265.

- D. Forest Certification: Provide components made with all wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1.6 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of operable panel partitions that fail in materials, fabrication, or installation within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Faulty operation of operable panel partitions.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal wear.
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineers, as defined in Division 01 Quality Requirements to design seismic bracing of tracks to structure above.
- B. Seismic Performance: Operable panel partitions shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. The term "withstand" means "the panels will remain in place without separation of any parts from the system when subjected to the seismic forces specified."
- C. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:
 - 1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E90, determined by ASTM E413, and rated for not less than the STC indicated.
 - 2. Noise-Reduction Requirements: Operable panel partition assembly, identical to partition tested for STC, tested for sound-absorption performance according to ASTM C423, and rated for not less than the NRC indicated.
 - 3. STC: 51.

2.2 OPERABLE ACOUSTICAL PANELS

- A. Partition System: operable acoustical panels, seals, finish facing, suspension system, operators and accessories.
- B. Product: Top supported individual, omni-directional panels
 - 1. Panel faces shall be laminated to appropriate substrate to meet the STC requirement specified in Acoustical Performance Article herein.
 - 2. Frames shall be of 16 gauge painted steel with integral factory applied aluminum vertical edge and face protection. Optional: Face finish shall wrap around the vertical panel edges and provide no protective vertical face trim.

3. Vertical sound seals shall be of tongue and groove configuration, ensure panel-to-panel alignment and prevent sound leaks between panels.
 4. Horizontal top seals shall be fixed continuous contact dual 4-finger vinyl.
 5. All standard panels shall have bottom retractable seals which provide a minimum of 2" floor clearance during movement of the partition, including all panels adjacent to pass door(s). Retractable bottom floor seal to exert downward seal force when activated. Floating or rigid seals that maintain contact with the floor during partition movement will not be acceptable.
 6. Optional: Bottom seals shall be fixed continuous contact 4-finger vinyl.
 7. Motor shall automatically extend/retract the bottom seals.
 8. No floor mounted seal activators are allowed.
 9. Panels must provide wall-to-wall contact for tight acoustical seal. Operable wall systems that do not extend to the back of storage pocket are not acceptable.
- C. Suspension system:
1. Track shall be of clear anodized architectural grade extruded aluminum alloy 6063-T6. Track design shall provide precise alignment at the trolley running surfaces and provide integral support for adjoining ceiling, soffit, or plenum sound barrier. Guide rails and/or track sweep seals shall not be required. Track shall be connected to the structural support by pairs of minimum. 3/8" [10] dia. threaded steel hanger rods.
 - a. Each panel shall be supported by one 4-wheeled carrier in the track and one internal 4-wheeled carrier. Wheels to be of hardened steel ball bearings encased with molded polymer tires.
- D. Safety Requirements:
1. Low profile hinges shall be of steel and project no more than 1/4" [6] beyond panel faces. Panels to have a minimum of three hinges.
 2. Each panel must be supported by a single carrier allowing the panels to stack freely without the use of rub rails near the pocket, thus decreasing the risk of injury while stacking into a pocket.
- E. Finishes
1. Face finish: Factory applied stain resistant fabric, upgraded from manufacturer's standard selection.
 2. Exposed metal trim and seal color: As selected by Architect and Owner from manufacturer's standard colors.
- F. Accessories:
1. ADA compliant pass door meeting requirements, of the same thickness and construction as the basic panels. Pass door leaf has perimeter trim to protect face finish and to provide visual identification as required by California Building Code.
 2. Finished end cover
 3. Recessed exit sign
 4. Lead panel with bulb seal
 5. Pocket doors

2.3 OPERATION

- A. Panels are manually moved from the storage area, positioned in the opening, and seals set.
- B. Retractable Horizontal Seals:

1. Retractable horizontal seals shall be activated by a removable quickset operating handle located approximately 42" [1067] from the floor in the panel edge. Seal activation requires approximately 15 lbs. [6.8 kg] of force per panel and approximately a 190 degree turn of the removable handle. Top and bottom retractable seals on each panel shall be operated simultaneously.
- C. Automatic Floor Seals:
1. Horizontal seals shall be activated by pressing the edge of the panel into the edge of the adjacent panel or wall.
 2. Seal activation requires approximately 15 lbs. [6.8 kg] of force per panel.
- D. Final partition closure to be by (select one):
1. 1. Lever closure panel with expanding jamb which compensates for minor wall irregularities and provides a minimum of 250 lbs. [113.4kg] seal force against the adjacent wall for optimum sound control.
 2. The jamb activator shall be located approximately 45" [1143] from the floor in the panel face and be accessed from either side of the panel. The jamb is equipped with a mechanical rack and pinion gear drive mechanism and shall extend 4"-6" [100-152] by turning the removable operating handle.
 3. 2. Pivot Panel (Optional for heights to 12'3" [3734] and a maximum of 10 panels): Pivot panel is attached to the wall and permits access between adjacent rooms. Pivot panel is of the same construction as basic panels but with continuous contact multi-ply vinyl top and bottom seals. The lead end of the panel has full height finger pull and vertical seal of multi-ply vinyl.

2.4 ACOUSTICAL PERFORMANCE

- A. Acoustical performance shall be tested at a laboratory accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) and in accordance with ASTM E90 Test Standards. Standard panel construction shall have obtained an STC rating of 51 minimum.

2.5 PANEL CONSTRUCTION

- A. Operable Acoustical Panels: Operable acoustical panel partition system, including panels, seals, finish facing, suspension system, operators, and accessories.
- B. Panel Operation: Manually-operated, continuously-hinged panels.
- C. Panel Construction: Provide top reinforcement as required to support panel from suspension components and provide reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
- D. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
1. Panel Width: As indicated.
- E. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.
1. Hinges: Manufacturer's standard.

2. Exit Device: Manufacturer's standard.

F. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish to match panel trim finish.

2.6 SEALS

A. General: Provide types of seals indicated that produce operable panel partitions complying with acoustical performance requirements and the following:

1. Manufacturer's standard seals.
2. Seals made from materials and in profiles that minimize sound leakage.
3. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.

B. Horizontal Top Seals:

1. Continuous-contact, extruded-PVC seal exerting uniform constant pressure on track.

C. Vertical Seals: Deep-nesting, interlocking astragals mounted on each edge of panel, with continuous PVC acoustical seals.

D. Top Seals: Panel top seals shall be fixed, flexible multi-fin.

E. Horizontal Bottom Seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.

1. Automatically Operated for Acoustical Panels: Extension and retraction of bottom seal automatically operated by movement of partition, with operating range not less than 2 inches (50 mm) between retracted seal and floor finish.

2.7 SUSPENSION SYSTEM

A. Suspension Tracks: Steel or aluminum as noted below with adjustable steel hanger rods for overhead support, designed for type of operation, size and weight of operable panel partitions as indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.

C. Aluminum Finish: Mill finish or manufacturer's standard, factory-applied, decorative finish unless otherwise indicated.

D. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

- E. Proof Load Testing: Submit test report from nationally recognized independent laboratory showing that assembly of track/trolley/bracket/hanger rod sustains a load of 8,000 pounds at mid-point of 48-inch simple span. Load applied to trolley via pendant bolt.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 10 22 26

SECTION 10 26 23 – IMPACT-RESISTANT WALL PROTECTION

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 SECTION INCLUDES

- A. Crash rails on all walls in storage rooms.
- B. Corner guards at library outside corners.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain impact-resistant wall-protection units through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall-protection units and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
 - 1. Do not modify intended aesthetic effects except with Architect's and Owner's approval. If modifications are proposed, submit comprehensive explanatory data to Architect and Owner for review.
- C. Fire-Test-Response Characteristics: Provide impact-resistant, plastic wall-protection units with surface-burning characteristics as determined by testing identical products per ASTM E84, NFPA 255, or UL 723 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide components identical to those tested in accordance with ASTM E84 for fire performance characteristics indicated. Identify components with appropriate markings from the testing organization.
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 450 or less.

3. Impact Strength: Provide components with minimum impact resistance of 25.4 ft. lbs per sq. ft. when tested in accordance with ASTM D256 (Izod impact, ft. lbs per inch notch).

2.2 WALL AND DOOR PROTECTION

- A. Crash Rails: Basis-of-Design: Construction Specialties Acrovyn
 1. Nominal 6-inch-high heavy-duty assembly consisting of a snap-on plastic cover installed over continuous aluminum retainer with color matching end caps mechanically fastened with concealed fasteners.
 2. Mounting Type: Surface mounted flush on wall.
 3. Cover: Extruded, impact-resistant plastic, minimum 0.08 inch thick,
 4. Retainer: Continuous one-piece extruded aluminum retainer, minimum 0.08 inch thick, with continuous bumper cushion centered in the extrusion.
 - a. Adhesive: Construction grade adhesive supplied by manufacturer.
 5. VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 6. Color: As selected from manufacturer's full range of colors.
 7. Fire performance characteristics: Provide engineered PETG wall protection system components with UL label indicating that they are identical to those tested in accordance with ASTM E84 for Class A/1 characteristics listed below:
 - a. Flame spread: 25 or less
 - b. Smoke developed: 450 or lessImpact Strength: Provide assembled wall protection units that have been tested in accordance with the applicable provisions of ASTM F476.
 8. Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.
- B. Provide joint caulk and metal trims as required to conceal field cut edges of panels, or panels. Fabricate to field verified dimensions to prevent field cutting.

2.3 CORNER GUARDS

- A. Surface-Mounted, Metal Corner Guards: Fabricated from 1-piece, formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.
 1. Wing Size: 2 by 2 inches.
 2. Height: Full height of wall.

2.4 MATERIALS

- A. Engineered Polyethelene Terephtalate Gylcol (PETG) Modified Resin Sheet: ASTM D543 for chemical and stain resistance.
 1. Smoke Density Rating: ASTM D2843, 75 percent maximum allowable.
 2. Combustion Rating: ASTM D635; CC1 rating (burn less than 1-inch minimum).
 3. Self-Ignition Temperature: ASTM D1929; 650 degrees F minimum.
 4. Surface Burning Characteristics: ASTM E84; Class B:
 - a. Flame Spread: 75 maximum.
 - b. Smoke Generated: 450 maximum.

- B. Colors and Textures of Plastic Material: Provide material that matches selections made from the manufacturer's full range of standard colors and textures.
 - 1. Chemical and stain resistance: ASTM D543
- C. Aluminum Extrusions: 6063-T6 Alloy and temper recommended for use and finish indicated, but with not less than strength and durability properties in ASTM B221 for 6063-T5.
- D. Stainless Steel: Type 304.
 - 1. Thickness: Minimum 0.0625 inch (1.6 mm).
 - 2. Finish: Directional satin, No. 4.
- E. Fasteners: Aluminum, nonmagnetic stainless steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with components, hardware, anchors, and other items being fastened. Use theft-proof fasteners where exposed to view.

2.5 FABRICATION

- A. Fabricate impact-resistant wall-protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.
- B. Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Fabricate with tight seams and joints, with exposed edges rolled. Provide surfaces free of wrinkling, chipping, uneven coloration, dents, or other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 10 26 23

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SECTION 10 28 13 – COMMERCIAL TOILET ACCESSORIES

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 SECTION INCLUDES

- A. Toilet Accessories per City of Gonzales requirements, including but not limited to:
 - 1. Warm air dryers.
 - 2. Toilet tissue dispensers.
 - 3. Seat-cover dispensers.
 - 4. Sanitary-napkin disposal units.
 - 5. Hand soap dispensers.
 - 6. Roll hand towel dispensers.
 - 7. Grab bars.
 - 8. Mirror units.
 - 9. Trash receptors.
 - 10. Diaper-changing stations.
 - 11. Robe hook at each single occupancy restroom (on wall behind door).
- B. Underlavatory guards.
- C. Custodial Accessories:
 - 1. Mop and broom holders at each janitor closet

1.3 RELATED SECTIONS

- A. Division 16: Basic Electrical Materials and Methods: Connections for electric hand dryers

1.4 QUALITY ASSURANCE

- A. Inserts and Anchorages: Furnish accessory manufacturers' standard inserts and anchoring devices that must be set in concrete or built into masonry. Coordinate delivery with other work to avoid delay.

1.5 COORDINATION

- A. Coordinate accessory locations, installation, and sequencing with other work to avoid interference with and ensure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.
- B. Coordinate accessory locations with other works to prevent interference with clearances required for access by people with disabilities.
- C. Provide thicker partitions where recessed or semi-recessed accessories are indicated to be installed.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form, made out to City and signed by manufacturer agreeing to replace units that deteriorate within specified warranty period indicated below:
 - 1. Warranty Period: 15 years from date of Project Acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis-of-Design: Bobrick, Dyson

2.2 MATERIALS

- A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 0.034-inch (22-gage) minimum thickness.
- B. Mirror Glass: Nominal 6.0-mm (0.23-inch) thick, conforming to ASTM C1036, Type I, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.
- C. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).
- D. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.
- E. Galvanized Steel Mounting Devices: ASTM A153, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

2.3 FABRICATION

- A. General: Only a maximum 1-1/2-inch-diameter, unobtrusive stamped manufacturer logo, as approved by Architect and Owner, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.
- C. Recessed and Semi-Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.
- D. Framed Mirror Units, General: Fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and

support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation.

1. Provide galvanized-steel backing sheet, not less than 0.034 inch (22 gage) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- E. Mirror Unit Hangers: Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove that will permit rigid, tamperproof, and theftproof installation.
- F. Keys: Provide universal keys for access to toilet accessory units requiring internal access for servicing, resupply, etc. Provide minimum of six keys to City's representative.

2.1 SCHEDULE

- A. Provide toilet accessories for each restroom and restroom stall, including but not limited to the following items:
 - B. Grab Bars: Toilet compartment horizontal two-wall bars, 1-1/2-inch diameter, one B-6806 x 36 and one B-6806 x 42, heavy-duty size, concealed mounting using manufacturer's standard flanges and anchorages; smooth, satin finish gripping surfaces.; locate at each accessible stall and at each single accommodation restroom.
 - C. Semi-Recessed Paper Towel Dispenser and Waste Receptacle: Bobrick B-3961 with 18 gallon receptacle or per City Standard, Approval; Qty: one at each restroom
 - D. Recessed Seat-Cover Dispenser, Sanitary Napkin Disposal and Toilet Tissue Dispenser, Disable-Access Compliant: Bobrick B-3091, B-3092 or Per City Standard, Approval; Qty: one at each Women's accessible stall/restroom
 - E. Surface-Mounted Toilet Seat Cover Dispenser, Sanitary Napkin Disposal and Toilet Paper Dispensers: Bobrick B-3579 or per City Standard, Approval; Qty: one at each women's non-accessible stall where partition-mounted combo is not provided.
 - F. Surface-Mounted Toilet Seat Cover Dispenser and Toilet Paper Dispensers: Bobrick B-3479 or per City Standard, Approval; one at each men's non-accessible stall where partition-mounted combo is not provided
 - G. Partition-Mounted Toilet Seat Cover Dispenser, Sanitary Napkin Disposal and Toilet Paper Dispensers: Bobrick B-357 or per City Standard, approval; one at each women's non-accessible stall where surface-mounted combo is not provided
 - H. Partition Mounted Toilet Seat Cover Dispenser and Toilet Paper Dispenser: Bobrick B-347 or per City Standard, Approval; one at each men's non-accessible stall where surface-mounted combo is not provided
 - I. Diaper Changing Stations: ADA compliant stainless steel; molded gray color polypropylene changing surface, external stainless bag hook, Koala KB310-SSRE or per City Standard, Approval.; Qty: one at each restroom, u.o.n. in the plans.
 - J. Stainless Steel Framed Mirror Units: Per City Standard

- K. Underlavatory Guard: White, antimicrobial, molded-vinyl covering for supply and drain piping assemblies intended for use at accessible lavatories to prevent direct contact with and burns from piping. Provide components as required for applications indicated with flip tops at valves that allow service access without removing coverings.
- L. Mop and Broom Holder/Utility Shelf: Bobrick B-239 or per City Standard, Approval
- M. Electric Hand Dryer: Basis-of-Design: Dyson Airblade.
 - 1. Electrical Supply: 110-120 V AC (208V also available - see technical specification), single phase 60 Hz
 - 2. Rated Power: 1400 W, 12.0A
 - 3. Motor Type: Dyson digital motor. Switched reluctance brushless
 - 4. Motor Speed: 81,000 rpm
 - 5. Heater Type: None
 - 6. Standby Power Consumption: 1 W
 - 7. Energy Consumption per Dry: .00468 kWh.

PART 3 - EXECUTION

- A. Install grab bars to withstand a downward load of at least 250 lbf, complying with ASTM F446.

END OF SECTION 10 28 13

SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

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 SECTION INCLUDES

- A. Fire extinguishers and cabinets.
- B. Knox boxes.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.
- B. Regulatory Requirements: Comply with applicable requirements of the laws, codes and regulations of Authorities Having Jurisdiction (AHJs). Obtain necessary approvals from AHJs.
- C. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- D. Fire Extinguishers: Provide extinguishers which are UL listed with UL listing mark for type, rating, and classification of extinguisher.
- E. Fire Extinguisher Cabinet Labels: Where fire-rated fire extinguisher cabinets are required, comply with ASTM E814.

1.4 COORDINATION

- A. Coordinate size of fire-protection cabinets and backing requirements to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Wall Depths: Coordinate sizes and locations of fire extinguisher cabinets.

PART 2 - PRODUCTS

2.1 EXTINGUISHERS

- A. Dry Chemical Type: UL 299, cast steel tank, with pressure gage; UL Rating 2A-10AB:C.
- B. At Kitchens: Wet Chemical Type: UL 299, stainless steel tank, with pressure gage; UL Rating 2A-K, and containing potassium acetate based, low PH agent, 6 liter.

2.2 CABINETS

- A. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
 - 1. Trim Type:
 - a. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend) of 5/16 inch.
- B. Door Material: Formed, enameled 18 gage, hollow metal design, reinforced for flatness and rigidity.
 - 1. Finish: Stainless Steel
- C. Door Style: Vertical duo panel with frame with identification lettering, or accepted equal.
 - 1. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER".
 - 1) Location: Applied to cabinet door.
 - 2) Lettering Color: Red.
 - 3) Orientation: Vertical.
- D. Door Glazing: Acrylic sheet.
 - 1. Acrylic Sheet Color: Clear transparent acrylic sheet.
- E. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Handle: Manufacturer's standard.
 - 2. Hinge Type: Continuous, of same material and finish as trim, permitting door to open 180 degrees.
 - 3. Lock: Steel cam type designed to permit opening of the cabinet door in and emergency by pulling sharply on the handle.
 - a. Factory Applied Lettering: "IN CASE OF FIRE ONLY - PULL FIRMLY ON HANDLE".
- F. Cabinet Mounting Hardware: Manufacturer's standard for cabinet.

2.3 FIRE DEPARTMENT KEY ACCESS BOXES

- A. Provide two fire department "Knox-Box" access key lock boxes meeting Gonzales Fire Department Standards. Apply for and order boxes through the local Fire Department having jurisdiction.
 - 1. City's Representatives to coordinate locations to be determined by the City of Gonzales Fire Department Standards. Recommended location is 4 to 5 feet above ground and no more than 2 feet from the door. Verify with City of Gonzales Fire Department.
 - 2. Boxes: Knox-box for recessed mount, 1/4-inch steel case, fully welded.
 - 3. Coordinate and provide keying and type per fire/police department, and other jurisdictional agency requirements.
 - 4. Series: as required by Fire Department.

5. Size: Minimum 3-3/4" deep, 4" wide x 5" high with lift off face plate as required by Fire Department.
6. Finish: Aluminum.
7. Provide surface mounting kit and all other required mounting accessories.

- B. Where boxes are to be located within concrete or masonry walls, Contractor shall furnish Knox recess mounting kits for casting in place.

2.4 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B.
- B. Transparent Acrylic Sheet: ASTM D4802, Category A-1 (cell-cast sheet), 3 mm thick, with Finish 1 (smooth or polished).

2.5 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
1. Weld joints and grind smooth.
 2. Construct fire-rated cabinets with double walls fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick, fire-barrier material.
 - a. Provide factory-drilled mounting holes.
- B. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim accurately.
- C. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
 2. Miter and weld perimeter door frames.
- D. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.
- E. Hinge doors for 180 degree opening with continuous piano hinge. Provide cam latch.
- F. Weld, fill, and grind components smooth.

2.6 FINISHES

- A. Extinguisher: Steel, red enamel color.
- B. Cabinet Trim and Door: Factory-finished stainless steel finish.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 10 44 00

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SECTION 10 5113 – METAL LOCKERS

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 SECTION INCLUDES

- A. Multiple-tier 18”d, metal lockers 8 at community center staff office.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain locker units and accessories through one source from a single manufacturer.
- B. Provide warranty in accordance with the warranty and/or guarantee requirements stated elsewhere in Contract Documents including, but not limited to, Part III: Contract Documents Contract, Part IV: General Conditions, and Division 1 of technical specifications.
- C. Warranty Period: Two years from the Project Acceptance.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver lockers until spaces to receive them are clean, dry, and ready for locker installation.
- B. Protect lockers from damage during delivery, handling, storage, and installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 1. Basis-of-Design: Penco Products, Inc., Guardian

2.2 MATERIALS

- A. Steel: Prime grade mild cold-rolled sheet steel free from surface imperfection, capable of taking a high-grade enamel finish and in compliance with ASTM A1008.
- B. Steel: Sheet steel components shall be fabricated using zinc-coated steel free from surface imperfection, capable of taking a high-grade enamel finish and in compliance with ASTM A879. Fasteners: Zinc- or nickel-plated steel, slot-less-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.
- C. Venting: Hold locker tops, bottoms, and shelves back 1/8 inch to allow adequate natural air flow.

- D. Doors: One-piece steel sheet, formed into channel shape at vertical edges and flanged at right angles at top and bottom edges. Fabricate to prevent springing when opening or closing, and to swing 180 degrees. Provide stamped, louvered vents in door face with no fewer than three louver openings at top and bottom.
- E. Continuously Sloping Tops: Manufacturer's standard steel sheet, for installation over lockers with separate flat tops. Fabricate tops in lengths as long as practicable, without visible fasteners at splice locations, finished to match lockers. Provide fasteners, filler plates, supports, and hipped-end type closures.

2.3 STANDARD DUTY LOCKERS

1. Standard Duty Lockers
 - a. Tops, bottoms, backs, sides and shelves: 24 guage sheet steel
 - b. Doors over 12 inches wide or 20"high: 16 guagues sheet steel
 - c. Doors 12 inches or less wide: 18 gauge sheet steel
 - d. Legs: No legs
2. Locker Body: Steel specially formed for added strength and rigidity and to ensure tight joints at fastening points.
 - a. Tops and bottoms with three sides formed 90 degrees, the front offset formed to be flush with horizontal frame member.
 - b. Shelves with four sides formed to 90 degrees, front edge having a second bend.
 - c. Hole spacing in locker body construction: Not exceeding 9 inches (225 mm).
 - d. Form door frame members to a channel shape, not less than 16 gauge steel.
 - e. Provide vertical door frame members with additional 3/8 inch (9.5 mm) flange as a continuous door strike.
 - f. Mortise and tenon inter-membering parts; electrically weld together in a rigid assembly capable of resisting strains.
 - g. Securely weld cross frame members of channel shapes to vertical framing members to ensure rigidity, including intermediate cross frame on double and triple tier lockers.
 - h. Optional factory assembly of locker bodies using rivets.
 - i. Center partitions: 24 gauge steel vertical partitions, full depth between bottom and shelf.
3. Locker Doors: One piece sheet steel
 - a. Multi-Point Latch Doors: Full channel formation of adequate depth to fully conceal lock bar on lock side, channel formation on hinge side, right angle formations across top and bottom, with holes for attaching number plates
 - b. Provide holes for attaching number plates.
 - c. Doors over 15 inches (380 mm) wide by 60 inches (1.524 m) or 72 inches (1.828 m) high: 3 inch (75 mm) wide 20 gauge full height reinforcing pan welded to inside face of door at 6 inch (150 mm) centers.
 - d. Ventilation: Flush door front with no exposed louvers and air flow slots located in top and bottom flanges of door.

B. INTERIOR EQUIPMENT:

1. ADA- Compliant Lockers (Recessed Handles with Multi-Point Latch):
 - a. Single Tier Lockers: Hat shelf 48 inches (1.219 m) maximum off the floor.
 - b. Locker Compartment Bottom: Minimum of 15 inches (230 mm) off the floor, or an extra shelf placed 15 inches (381 mm) off the floor for unobstructed forward and side reach.
 - c. Handicapped symbol attached to door.

- d. Hooks and rods as specified for other lockers.

2.4 HARDWARE

- A. Continuous Hinges: Manufacturer's standard, steel continuous hinge mounted to door and frame.
- B. Lock System Handle and Latch: Manufacturer's standard, positive automatic, pre-locking, pry-resistant latch and pull, ADA compliant; chromium-plated, heavy-duty, vandal-resistant, lift-up handle. Provide strike and eye for padlock.
- C. Hooks: Manufacturer's standard zinc-plated, ball-pointed steel. Provide 1 double-prong ceiling hook and not fewer than 2 single-prong wall hooks. Attach hooks with at least two fasteners.
- D. Number Plates: Manufacturer's standard etched, embossed, or stamped, aluminum number plates with numerals at least 3/8 inch (9 mm) high. Number lockers in sequence indicated. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
- E. Legs: Provide nominal 6-inch- (152-mm-) long legs by extending vertical frame members, or by attaching gusset-type legs to locker body. Fabricate legs from at least 0.0598-inch- (1.50-mm-) thick steel sheet, with provision for fastening to floor, and finished to match lockers.
- F. Closed Front/End Bases: Steel sheet, manufacturer's standard thickness, without overlap or exposed fasteners, finished to match lockers.

2.5 FABRICATION

- A. Unit Principle: Fabricate each locker with an individual door and frame, individual top, bottom, back, and shelves, and common intermediate uprights separating compartments.
- B. Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch. Weld frame members together to form a rigid, one-piece assembly.
 - 1. Form locker-body panels, doors, shelves and accessories from one-piece steel sheet, unless otherwise indicated.

2.6 FINISHES, GENERAL

- A. Provide pre-finished lockers, flat and free of scratches and chips.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-enamel finish consisting of a thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 1.4 mils (0.036 mm) on doors, frames, and legs, and 1.1 mils (0.028 mm) elsewhere.

1. Color and Gloss: As selected by Architect from manufacturer's full range.
- D. Ensure exposed and semi-exposed joints are tight and true.
- E. Fabricate corners, end panels, and fillers as required by installation.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 10 5113

SECTION 10 56 10 - METAL STORAGE SHELVING

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

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

1.2. SUMMARY

- A. This section includes the following at storage rooms:
 - 1. 4-Post shelving units, fabrication and installation including leveling.
- B. Related Work:
 - 1. Structural floor system capable of supporting loads required by prevailing building codes, including loads of storage units to be installed. Provide a maximum allowable sub floor deflection of L/480 under specified storage loads.

1.3. PERFORMANCE REQUIREMENTS

- A. Due to the user's preference and requirements for safety, performance, and flexibility, all following specification line items are mandatory.
- B. Seismic Performance: Provide fixed shelving capable of withstanding the effects of earthquake motions as determined according to CBC 2019 and local building codes.
- C. Design Requirements: All shelving elevations as indicated on Drawings.
- D. Color Samples: Provide sample for each exposed product and for each color required.
- E. Selection Samples: For selection of colors and textures, submit manufacturer's color charts consisting of actual product samples, showing full range of colors and textures available.
- F. Warranty: Submit a written warranty, executed by the contractor, installer and manufacturer, agreeing to repair or replace units that fail in materials or workmanship within the specified warranty period. This warranty shall be in addition to, not limitation of, other rights the owner may have against the contractor under contract documents.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Failure of operating components.
 - 2. Warranty Period: Five years from date of Substantial Completion for defects in materials.
- G. Warranty Period: One year from date of Substantial Completion for workmanship

1.4. QUALITY ASSURANCE

- A. Installer Qualifications: Hire an experienced installer who is the manufacturer's authorized and certified representative. Provide shelving by one manufacturer for entire Project.
 - 1. Minimum Qualifications: 5-year experience installing systems of similar size and complexity to specified project requirements.

2. Source Limitations: Obtain shelving through one source from a single manufacturer.

PART 2 - PRODUCTS

2.1. MATERIALS

- A. Volatile Organic Compound (VOC) Emissions and Toxic Substances: Provide materials with minimal or no volatile organic compound (VOC) emissions per state and local regulations and free of toxic substances
- B. Recycled and Local Requirements:
 1. Provide materials with highest available post-industrial and post-consumer recycled content.
 2. Provide materials from local sources (within 500 miles of Project) unless no local source exists.
- C. Sheet Steel: ASTM A366, cold-rolled sheet, commercial quality, Class 1, matte finish, stretcher-leveled, free of scale and imperfections, with consistent texture and smoothness.
- D. Fasteners: Cadmium-plated or zinc-plated steel, manufacturer's standard types and sizes
- E. Upright Frames: Upright frames are made of two or more cross members welded to the top and bottom (and center if necessary) of the post and forming a rectangular upright frame. Each post shall be made of 16-gauge 1 ¼" x 1 ½" rectangular shaped cold rolled steel. The lateral sides of the posts are slotted at every one inch increment. The slots are 3/16" wide x 5/8" long and are designed to accommodate a variety of shelf and roll-out drawer configurations. The back of the post is also slotted at every 1 ½" increment with two rows of slots side by side from top to bottom. They are 3/16" wide x 5/8" long with 3/8" between the two rows. The uprights must allow for component integration on either 1" or 1 ½" increment depending only on the selected shelf component. Due to aesthetic concerns, user's performance requirements, safety of users and stored materials, and to provide maximum flexibility, "L & T 4-Post" utility shelving system styles are unacceptable.
- F. Cross Members: Cross members are 4" high x ½" wide. They are made of 16-gauge steel folded to create a "U" shape channel. At both ends, hook type design allows to snap the cross members in both rows of slots at the same time. The cross members shall be welded to the post. Non-welded frames must be available to minimize shipping volume, thus reducing truck pollution.
- G. Levelers: Each post shall have an integrated leveler, inserted into formed upright tube, which allows for ¾" adjustment to accommodate for uneven floor surface. No temporary shims or other third party leveling device will be accepted.
- H. Supported type:
 1. Full-depth shelves: Full-depth shelves are made of box rolled formed 22-gauge steel, with "Four Bend" ¾" edge construction which adds additional strength and capacity as well as it creates a hidden safety edge to protect people and items. The full-depth shelves are supported by two longitudinal shelf supports and the appropriate number reinforcement channels. Shelves are also available in 18-gauge steel as an option.
 2. Longitudinal supports: [¾" high supports] or [1 ¼" high supports for heavy duty application] are made of one "U" shaped 12-gauge steel channel. A standard formed steel claw is welded at each end to form a complete support. These supports are inserted into the

slots located at the back of the post.

3. Front-to-back reinforcement channels: [$\frac{3}{4}$ " high reinforcement channels] or [1 $\frac{1}{4}$ " high reinforcement channels for heavy duty application] are made of 12-gauge steel formed in a "U" shaped channel and are sitting on the longitudinal shelf supports.
4. Base support: A 12-gauge steel special "U" shaped channel is provided for the bottom shelf. The support is inserted at the bottom of each post and anchored to the floor or to the carriage, in compliance with seismic standards.

2.2. FINISH SPECIFICATIONS

- A. Sheet Steel Finish: Baked enamel finish; minimum of 1.4 mils dry film thickness, except where otherwise specified.
 1. Thoroughly clean steel parts in phosphatizing solution to insure removal of oil, grease, and other foreign material which could interfere with adhesion of finish.
 - a. Wipe thoroughly after cleaning to remove grit and oil from surfaces.
 2. Apply finish immediately after cleaning.
 3. Provide coating with abrasion coefficient of 25 liters per mil when tested in accordance with ASTM D968.
 4. Gloss: Medium gloss of 50 to 65 degrees on standard glass meter.
- B. Colors: As selected by Architect and Owner from manufacturer's full range of colors.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 10 56 10

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SECTION 10 71 13 – EXTERIOR SUN CONTROL DEVICES

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 SECTION INCLUDES

- A. Window Louvers: Horizontal aluminum sunshade system, including accessories, mountings, and shims. Sunshades are anchored directly to the vertical storefront mullions.

1.3 RELATED SECTIONS

- A. Section 05 12 00 – Structural Steel Framing: Support system for sunscreens.
- B. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts.

1.4 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated shall stamp and sign engineering. Engineering services are defined as those performed for installations of sun controls that are similar to those indicated for this Project in material, design, and extent.
- B. Welding Standards: As follows:
 - 1. AWS D1.2, "Structural Welding Code—Aluminum".
 - 2. AWS D1.3, "Structural Welding Code—Steel Sheet".
 - 3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- C. Weld Strength: Fillet welds produced with Pulsed Gas Metal Arc Welding (BMAW/MIG) process to withstand a minimum of 526 pounds of force in shear
- D. SMACNA Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" recommendations for fabrication, construction details, and installation procedures.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineering as defined in Division 1 to design seismic restraints and attachment devices
- B. Structural Performance: Provide exterior sun control assemblies capable of withstanding the effects of loads and stresses from dead loads, live loads, wind loads, and normal thermal

movement without evidencing permanent deformation of assembly or components including blades, frames, and supports; nose or metal fatigue caused by blade rattle or flutter; or permanent damage to fasteners and anchors.

1. Dead Load: As required by 2019 CBC.
2. Live Load: as required by 2019 CBC.
3. Wind Load: As indicated on Structural Drawings.
4. Thermal Movements: Provide assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, and other detrimental effects:
 - a. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
5. Seismic Criteria: provide exterior sun control devices designed and installed to withstand the effects of earthquake motions and requirements of authorities having jurisdiction.

- C. Drainage: provide positive drainage to exterior for moisture entering or condensation occurring within sun control device systems.

2.2 MANUFACTURERS

- A. Basis-of-Design Product:
 - a. Horizontal Sunshade: Kawneer Versoleil Sunshade Outrigger system, Planar blade

2.3 HORIZONTAL SUNSHADE

- A. Sunshade Members: Manufacturer's standard extruded or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
- B. Fasteners and accessories: Nonmagnetic stainless steel to be non-corrosive and compatible with aluminum members, anchors, and other components.
- C. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- D. Materials
 1. Aluminum: Alloy and temper recommended by glazed aluminum curtain wall and storefront system manufacturer for strength, corrosion resistance, and application of required finish, and complying with ASTM B 221: 6063-T6, 6105-T5, or 6061-T6 alloy and temper. Wall thickness at any location for the main frame to be not less than 0.070" (1.78 mm).
 2. Thermal Barrier: When applied on a thermally broken captured system, sunshade shall be thermally isolated from the interior aluminum mullions by a nominal 0.25" (6.3 mm) thick low conductance material.
 3. Aluminum sheet alloy: Shall meet the requirements of ASTM B209.
 4. Sealant: For sealants required within fabricated sunshade system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

5. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed curtain wall and storefront members are nominal and in compliance with AA Aluminum Standards and Data.
 6. Red List Free: Product does not contain PVC or Neoprene.
- E. Accessory Materials
1. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762 mm) thickness per coat.
- F. Aluminum Finishes: Match Storefront, Kawneer Permaflour (70% PVDF), AAMA 2605, Fluoropolymer Coating, color to be selected by Architect with Owner's approval.

2.4 FABRICATION

- A. Assemble sun control assemblies in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Window Louvers: Fixed aluminum architectural louver system with kynar finish in a custom color.
- C. Trellis Canopy: Aluminum extrusion with removable anchor plate, wood-look applied finish.
- D. Sun control assemblies shall be assembled entirely by welding. Join components with a minimum of two fillet welds, each 1-inch (25 mm) long produced with the Pulsed Gas Metal Arc welding (GMAW/MIG) process with minimum 0.125-inch (3.18 mm) throat.
- E. Maintain equal sun control blade spacing, including separation between blades and frames to produce uniform appearance.
- F. Include supports, anchorages, and accessories required for complete assembly.
- G. Join frame members to one another and to fixed sun control blades with fillet welds concealed from view, unless size of sun control assembly makes concealed, bolted connections between frame members necessary.

2.5 ALUMINUM FINISHES

- A. General: Comply with NAAMM "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to application and designations of finishes.
- B. Finish sun controls after assembly.
- C. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
1. Color and Gloss: Match storefront system.

2.6 ACCESSORIES

- A. Fasteners: Of same basic metal and alloy as fastened metal or 300 series stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined materials.
 - 1. Use types and sizes to suit unit installation conditions.
 - 2. Use Phillips flat-head screws for exposed fasteners, unless otherwise indicated.
- B. Anchors and Inserts: Of type, size, and material required for loading and installation indicated. Use nonferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as needed for corrosion resistance. Use toothed steel or expansion bolt devices for drilled-in-place anchors.
- C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 but containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D1187.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 10 71 13

SECTION 10 75 00 – FLAGPOLES

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 SECTION INCLUDES

- A. Aluminum flagpole, ground mounted.

1.3 RELATED SECTIONS

- A. Section 03 30 00 – Cast-in-Place Concrete: Concrete base and foundation construction.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain flagpole as complete unit, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.
- B. Engineering Responsibility: Design flagpole foundation under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of California.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.
- B. Protect flagpole and accessories from damage and moisture.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 1. Basis-of-Design: L. PH. Bolander Flagpoles.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
 - 1. Seismic Loads: As indicated on Structural Drawings according to SEI/ASCE 7.
 - 2. Wind Loads: As indicated on Structural Drawings according to SEI/ASCE 7.
 - 3. Base flagpole design on nylon flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.
 - a. Flagpole with Flag Flying: Resistant without permanent deformation to 90 miles/hr wind velocity; non-resonant, safety design factor of 2.5.

- b. Flagpole without Flag: Resistant without permanent deformation to 120 miles/hr wind velocity; non-resonant, safety design factor of 2.5.

B. Coordinate flagpole size with City of Gonzales.

2.3 MATERIALS

A. Aluminum: ASTM B221, 6063 alloy, T6 temper.

B. Steel: ASTM A53/A53M, Type S, Grade B.

2.4 FLAGPOLES

A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:

1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
3. Minimum wall thickness of 0.156 inch; cone tapered in top 29 feet, with a butt diameter of 8 inches and top outside diameter of 3-1/2-inches.

B. Exposed Height: 40-feet measured from nominal ground elevation.

C. Aluminum Flagpoles: Provide entasis-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B241/B241M, Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm).

D. Sleeve for Aluminum Flagpole: Fiberglass or PVC pipe foundation sleeve, made to fit flagpole, for casting into concrete foundation.

1. Provide flashing collar of same material and finish as flagpole.

E. Halyard: External type.

F. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.

1. Truck Assembly: Cast aluminum; revolving, stainless steel ball bearings, non-fouling.
2. Halyard Flag Snaps: Provide two stainless-steel swivel snap hooks per halyard.
3. Halyard: 1/8 inch diameter stainless steel aircraft cable.

2.5 MOUNTING COMPONENTS

A. Foundation Tube Sleeve: AASHTO M-36, corrugated 16 gage steel, galvanized, depth of 48 inches as recommended by manufacturer.

B. Pole Base Attachment: Tube; spun aluminum flash collar.

C. Lighting Ground Spike: Steel, welded to plate at bottom of tube sleeve.

2.6 MISCELLANEOUS MATERIALS

- A. Sand: ASTM C33/C33M, fine aggregate.
- B. Elastomeric Joint Sealant: Single-component nonsag urethane joint sealant complying with requirements in Division 7 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

- A. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
- C. Gold Anodic Finish: AAMA 611, AA-M32C22A43 Class I, 0.018 mm or thicker; gold color.

2.9 FINISHES

- A. Metal Surfaces in Contact with Concrete: Asphaltic paint.
- B. Concealed Steel Surfaces: Galvanized to ASTM A123/A123M 1.25 oz/sq ft.
- C. Aluminum: Clear anodized.
- D. Finial Ball: Anodized spun gold finish.

2.10 ACCESSORIES

- A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
 - 1. Aluminum, 0.063-inch (1.6-mm) spun aluminum, finished to match flagpole.
- B. Flags:
 - 1. U.S. design, 5 by 8 feet, nylon fabric, brass grommets, hemmed edges.
 - 2. State of California, 5 by 8 feet, nylon fabric, brass grommets, hemmed edges.
- C. Cleats: 9 inch size, aluminum with stainless steel fastenings, two per halyard.

- D. Connecting Sleeve for Multiple Section Poles: Same material of pole, precision fit for field assembly of pole, concealed fasteners.
- E. Primer: Zinc chromate type.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 10 7500

SECTION 11 24 26 - FALL PROTECTION DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Fall Arrest System with Horizontal lifeline fall restraint for worker safety

1.2 SYSTEM DESCRIPTION

- A. General: Provide structural fall arrest system capable of withstanding loads and stresses within limits and under conditions specified in OSHA and other applicable safety codes. Provide fall protection system permanently attached to roof structure. Provide cable lifeline system to allow continuous travel past intermediate anchor points.
- B. Delegated Design Requirements: Anchors and accessories comprising system of following types:
1. Anchors spaced as indicated by manufacturer, for safety snap connection by individual workers capable of withstanding a 5,000 pound load or safety factor of 2 meeting the requirements of OSHA 1926.502(d)(8).
 2. Continuous stainless steel cable lifeline restrained by swaged terminations at anchor points, suitable for multiple safety snap connections along cable between anchors.
 3. Tensioning system.
 4. In-line shock absorbers.
 5. Pass-thru technology allowing cable shuttle to run freely past intermediate anchors without the need to disconnect from the fall protection system.
- C. Performance Requirements: System and components tested for the resistance of the following loads:
1. Fall Arrest: 2 Users
 2. Provide engineered system capable of withstanding a safety factor of 2 meeting the requirements of OSHA 1926.502(d)(8).
 3. Design system to limit loads on horizontal lifeline anchors to 2,500 pounds.

1.3 COORDINATION

- A. Contractor to coordinate installation of structural deck to meet requirements of roof anchor manufacturer and code requirements.
- B. Contractor to coordinate installation of structural deck reinforcements and anchorages to receive fall protection anchors.
- C. Contractor to coordinate placement of roofing system, insulation and flashing to ensure water-tight integrity to roof.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm having at least 10 years continuous experience in manufacturing fall safety equipment similar to systems specified and exhibiting records of

successful in-service acceptability and performance. Firm must employ personnel dedicated to provide regularly scheduled Authorized and Competent Person Training courses as mandated by OSHA 1926 and 1910 for owner's authorized safety personnel.

- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of roof anchors that are similar to those indicated for this Project in material, design and extent.
- C. OSHA Standards: Comply with Occupational Safety and Health Administration Standards for the Construction Industry 29 CFR § 1926.500 Subpart M (Fall Protection), and with applicable State Administrative Code safety standards for Fall Arrest.
- D. Source Limitations: Obtain all roof anchors through one source from a single manufacturer.
- E. Testing: Perform quality control tests for each system per manufacturer's requirements.

1.5 WARRANTY

- A. Provide manufacturer's standard warranty to guarantee products will be free from defects for a period of 12 months. Warranty period shall become effective on date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis-of-Design Product: Miller; ShockFusion Horizontal Lifeline Roof System and Straight Line System Kit.

2.2 MATERIALS

- A. General: All materials shall be resistant to corrosion due to atmospheric exposure. All steel components shall be hot dip galvanized or have an equivalent protective surface to prevent corrosion. Aluminum parts shall be of an appropriate alloy that will not corrode under normal outdoor conditions. All stainless steel will conform to A6xx, type 303, 304, 306, or 316.
- B. Roof Posts: Designed for straight-line system.
 - 1. Activation Force: 1,100 lbs
 - 2. Shock Absorption Force: 2,500 lbs
 - 3. Ultimate Strength: 5,000 lbs.
 - 4. Energy Absorber: Type 304 stainless steel
 - 5. Materials:
 - a. Connecting Components: Type 304 and 18-8 stainless steel
 - b. Post Tube: Zinc-Plated/Powder Coated Steel.
 - c. Post/Base Plate Seal: HDPE and Neoprene.
 - d. Post Cap: HDPE with UV Inhibitor.

- C. Base Plate: ShockFusion Kit with Multipurpose Roof Base.
- D. Lifeline Cable: 13mm diameter type 316 stainless steel wire rope as tested by fall protection device manufacturer to permit worker continuous mobility and safety.
- E. “Xenon” Cable Shuttles: Detachable cable shuttle providing secure attachment to cable at any location. Stainless steel Z15CN1703 & Silicone over moulding.
 - 1. Locking Button: Stainless Steel 304L.
 - 2. Maximum Capacity: 136 kg (300 lbs).
 - 3. Breaking Strength: > 25kN (5620.2lbf).
 - 4. Operating Temperature: -50°C to +90°C (-122°F to +194°F).
 - 5. Weight: 0.797kg (1.76lbs)
- F. Fasteners: Unless otherwise indicated, provide stainless steel fasteners or zinc-plated fasteners with coating complying with ASTM B 633 F 1941, Class Fe/ZN 5, or equivalent. Select fasteners for type, grade, and class required.

2.3 FABRICATION

- A. Fabricate work true to dimension, square, plumb, level, and free from distortions or defects detrimental to appearance and performance.
- B. Prepare, treat and coat galvanized metal to comply with manufacturer's written instructions. Prepare galvanized metal by removing grease, dirt, oil, flux, and other foreign matter.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Installation of anchor points to be performed by contractor according to manufacturer’s instructions and recommendations.
- B. Provide on-site inspection and supervision of installation of lifeline components by factory-trained representative.

3.2 TESTING

- A. At the completion of the installation, 25% of the straight line system shall be tested to 1.25x of its design load.
- B. At the completion of the installation, 25% of the shuttle system shall be tested to 1.25x of its design load.
- C. All test results and related data shall be tabulated in a report for review by the engineer.

3.3 DEMONSTRATION

- A. Demonstrate all equipment with relation to description of operation as required by CAL-OSHA to the satisfaction of the owner’s representative.
- B. Instruct Owner's designated safety engineer in proper use of fall protection safety devices.

- C. Adjust system devices as required by manufacturer. Replace damaged or malfunctioning items.
- D. Provide the necessary training and instruction for the ongoing inspection and service of the system in accordance with Title 8 of the California Code of Regulations...General Industry Safety Orders.

END OF SECTION 11 24 26

SECTION 11 40 00 – FOOD SERVICE EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- B. Work to be provided and installed includes, but is not limited to:
 - 1. Furnish all labor, materials and services necessary for the assembly and setting in place of the equipment in strict compliance and in accordance with the contract documents.
 - 2. Cut holes; provide sleeves for pipes on equipment, for drains, electrical, plumbing, etc., as required for proper installation.
 - 3. Repair any damage resulting from installation.
 - 4. Remove all debris resulting from this installation, clean and all equipment for operation, as well as an acceptance test by the Owner.

1.2 WORK PERFORMED BY SECTIONS OTHER THAN FOOD SERVICE EQUIPMENT

- A. Mechanical and Plumbing and Utilities: Mechanical and Plumbing rough-in; ducting, piping and final connection between rough-in and equipment; installation of mechanical and plumbing devices and fittings in utility lines; interconnecting field ducting and piping between foodservice equipment and components; exhaust ducts, exhaust fans, indirect waste lines, floor cleanouts and floor sinks.
- B. Electrical rough-in; conduit, conductors and final connection between rough-in and equipment; installation of electrical fittings and devices in utility lines; interconnecting field wiring between foodservice equipment and components; circuit breakers panels other than those integral with foodservice equipment; final disconnect means.

1.3 DESIGN CRITERIA

- A. Refer to Room Summary for Kitchen requirements.

1.4 LAWS AND ORDINANCES

- A. Certify that all work and materials comply with Federal, State and Local laws, ordinances and regulations and is confirmed by the local inspector having jurisdiction.
- B. Work and materials must be in full accord and when appropriate, shall be listed with the following agencies:
 - 1. Local Health Department
 - 2. National Sanitation Foundation (N.S.F.)
 - 3. Underwriters Laboratories (U.L.) or ETL equivalent
 - 4. A.G.A.
 - 5. N.F.P.A. – latest edition, for exhaust system
- C. Check and confirm that drawings and specifications meet all Federal, State and Local Government bodies. The drawings and specifications shall govern wherever they require larger sizes or higher standards than required by local agencies and regulations. The regulation shall govern when drawings and specifications indicate less than the required regulation. Owner shall not be held responsible or be charged extra charges related to code compliance.

1.5 QUALITY ASSURANCE

A. Qualifications

1. Foodservice Equipment Contractor (FSEC) and its sub-contractors to have at least 5 years experience in this type of work. Upon request provide at least three references for jobs of similar size and content.
2. Commercially manufactured equipment is not acceptable unless evidence furnished that similar equipment has been operating successfully in a minimum of three (3) installations (excluding testing laboratories, field-testing or prototypes) for at least one (1) year.
3. Commercially manufactured equipment will be reviewed based on submittal data provided on manufacturer's literature and/or manufacturer's shop drawings for prime alternate or substituted items. Failure of the equipment to meet the capacity, operation, size, utility and production as submitted will result in the rejection of the equipment regardless of disclaimers.
4. Custom-fabricated equipment shall be manufactured by a foodservice equipment fabricator with at least five (5) years experience in this type of work, who has the plant, personnel, and engineering facilities to properly design, detail and manufacture high quality foodservice equipment. All custom fabricated equipment to comply with NSF standards from a fabricator who is licensed to do so.

B. Requirements of Regulatory Agencies:

1. NSF Compliance: All equipment subject to NSF approval shall be so labeled, or shall be constructed in accordance with applicable published NSF standards.
2. Refrigerating Equipment: Conform to all applicable ASHRAE Standards. Evaporators NSF approved; electrical components UL (or ETL) approved.
3. Electrical Equipment: Equipment shall carry UL (or ETL) approval and comply with applicable standards of the National Electric Code. Where specified, items shall be UL approved as a unit; if not, specified component electrical parts shall be approved separately. Where applicable, equipment shall comply with NEMA and NBFU standards. Where local regulations permit, a certified test report by an approved nationally recognized independent testing organization establishing proof of conformance to the standards, including test methods of UL, will be considered in lieu of UL label.
4. Civil Authorities: Comply with all ordinances, codes and regulations of civil authorities having jurisdiction at Job Site.
5. Sheet Metal Fabrication: Comply with NFPA standard No. 51: "Welding and Cutting"; and applicable NSF standards.
6. ADA Compliance: Installation and construction of equipment and furnishings to comply with the American Disabilities Act as described in the Department of Justice Register Volume 56, No. 144.

1.6 GUARANTEE AND WARRANTY

- A. All equipment shall be fully guaranteed against defects in workmanship and material for one (1) year after Owner's final acceptance. All repairs and replacements shall be made without charge to the Owner. Guarantee period shall commence with the first usage of the equipment for the intended purpose after final acceptance. Also see additional guarantee required for refrigeration equipment.

1.7 EQUIPMENT ACCESS

- A. Verify all building conditions and coordinate proper access of large equipment to the building. Any specific items needed for the movement of large, heavy or bulky equipment is the full responsibility of the Contractor.

1.8 START-UP DEMONSTRATION AND MANUALS:

- A. Provide factory-trained engineers for start-up and demonstration of equipment. Demonstration shall be done in two stages: One for operation and the second for maintenance personnel.
- B. Return to the job site within 10 days for final adjustment and calibration of equipment.
- C. Furnish service parts manuals as well as maintenance manuals.
- D. Prepare list of service agencies authorized by the manufacturer to service its equipment. Include the name of the person to contact and a telephone number.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS OF FABRICATION

- A. Fabrication shall conform to general acceptance of the foodservice industry.
- B. Fabrication shall meet or exceed National Sanitation Foundation standards including the latest editions and revisions.

2.2 MATERIALS

- A. Stainless Steel (S/S): Stainless steel shall be of U.S. Standard-gauges as indicated, but not less than 18-gauge or as noted, Type 304 with No. 4 finish.
- B. Galvanized Steel: Galvanized steel shall be of 14-gauge and shall be electro galvanized. Galvanized steel shall be used in non-exposed areas, areas, which have no contact with food or food serving items and in framework, when used in framework, galvanized steel shall be, welded construction.
- C. Laminated Plastic (L/P):
 - 1. Shall be Formica, Parkwood, LamiArt, or approved equal.
 - 2. Shall be veneered with approved waterproof and heatproof cement. Rubber base adhesives are not acceptable.
 - 3. Shall be applied directly over 3/4-inch plywood.
 - 4. Exposed faces and edges shall be faced with 1/16-inch thick material. Corresponding backs shall be covered with approved backing and balancing sheet material.
- D. Solid Surface Material (SSM):
 - 1. Shall be Granite, Caesarstone, Silestone or approved equal and installed over 3/4-inch plywood per manufacturers' instructions. Provide air space, trim and/or insulation around any heat or cold producing equipment to guard against discoloration and cracking.
- E. Sealants and Adhesives: Refer to "Sustainable Design Requirements" for VOC limits for products used inside and applied on-site.
- F. Certified Wood: Provide wood that is certified by the Forest Stewardship Council (FSC).

2.3 METAL TOP CONSTRUCTION

- A. Metal tops shall be one-piece 14-gauge welded construction, including field joints. Secure to a full perimeter galvanized steel channel frame cross-braced not farther than 30 inches on center. Fasten top with stud bolts or tack welds. All exposed leading top edges to have "highlighted" #8 finish.

2.4 ENCLOSED CABINET BASES

- A. Bases shall be fabricated from not less than 18-gauge steel reinforced by forming the metal ends and shelves. Partitions shall be all of stainless steel. The ends and vertical partitions may be of single wall construction, with a 2-inch face, all partitions and sides shall be welded in the intersection and flush with the bottom.
- B. Unexposed backs and structural members may be constructed of galvanized steel.
- C. Intermediate shelves shall be removable, except the bottom shelf when the cabinet is on legs. When the cabinet is on a masonry base, the bottom shelf shall be removable to allow access for cleaning.

2.5 LEGS AND CROSS RAILS

- A. Legs and cross railings shall be 1-5/8-inch, 16-gauge stainless steel tubing. All cross rails shall be continuously welded, grounded and polished. Tack welds or other methods of connection are not acceptable. Bottoms of legs shall be wedged inward and fitted with a stainless steel bullet type foot with not less than 2-inch adjustment. Freestanding legs shall be pegged to floor with 1/4-inch stainless steel rod.
- B. Stainless steel gusset shall be not less than 3-inch diameter at top and 3-3/4-inch long. Outer shell 16-gauge stainless steel reinforced with 12-gauge mild steel inserts welded interior shell. Gusset shall be large enough to accommodate 1-5/8 inch tub with provision for Allen screw fastener.
- C. Low counter leg shall be constructed of stainless steel exterior of 5-3/4 inch minimum height or 7 inch maximum height with 3-1/2 inch square plate with four countersunk holes, welded to the top for fastening.
- D. Adjustable foot shall be constructed of stainless steel 1-1/2 inch diameter tapered at the bottom to 1-inch diameter, fitted with treaded cold rolled rod for minimum 1-1/2 inch by 3/4-inch threaded bushing plug welded to legs.
- E. When legs are fastened to equipment, the following methods should be used.
 - 1. Sinks: Reinforced with bushings and set screws.
 - 2. Metal Top Table or Dishtable: Welded to galvanized steel frame of 14-gauge or more and secure to the top with screws through slotted holes.
 - 3. Wood or Composition Top: A welded stainless steel channel of not less than 14-gauge, secured to the top with screws through slotted holes.

SHELVES

- F. When shelves are part of the fixture, the following shall take place.
 - 1. Open base type shelf shall be notched around the leg and continuously welded to the leg.
 - 2. Cabinet base type shelf shall be turned up on the back side a minimum of 1/4 inch radius and further slightly to insure a tight fit to enclosure panels.
- G. Wall shelves shall be one-piece 16-gauge welded construction, including field joints. Secure walls with 14-gauge S/S brackets at 36-inch on-center maximum. All exposed leading edges to have "highlighted" #8 finish.
- H. Over-shelves shall be one-piece 16-gauge welded construction, including field joints. Secure to 1-inch tubular supports at 60-inch on-center maximum attached to counter tops. All exposed leading edges to have "highlighted" #8 finish.

2.6 SINKS

- A. When multiple compartments are part of the design, they shall be continuous on the exterior without applied facing strips or panels. Bottoms of each compartment shall be creased such as to ensure complete drainage to waste opening.
- B. Partitions between compartments shall be double thickness continuous and welded.
- C. Where sink bowls are exposed, the exterior shall be polished to a number 4 finish.
- D. Fabricator shall provide drains, wastes and faucets as indicated on drawings, or itemized specifications

2.7 OTHER FABRICATED COMPONENTS

- A. Casters:
 - 1. Shall be heavy-duty type, ball bearing, solid or disc wheel with non-marking greaseproof rubber, neoprene or polyurethane tire.
 - 2. Wheel shall be 5-inch diameter, minimum width of tread 1-1/2-inch, with a minimum capacity per caster of 250 pounds.
 - 3. Solid material wheels shall be provided with stainless steel rotating wheel guards.
 - 4. Shall be sanitary, have sealed wheel and swivel bearings and polished plate finish
- B. Doors:
 - 1. Metal doors shall be double cased stainless steel. Other pans shall be 18-gauge stainless steel with corners welded, ground smooth, and polished. Inner pan shall be 20-gauge stainless steel fitted tightly into outer pan with a sound deadening material such as Celotex or Styrofoam used as a core. The two pans shall be tack welded together and joints solder filled. Doors shall finish approximately 3/4-inch thick and be fitted with flush recessed type stainless steel door pulls.
 - 2. Sliding doors shall be mounted on large, quiet ball bearing rollers in 14-gauge stainless steel overhead tracks and be removable without the use of tools. Bottom of cabinet shall have stainless steel guide pins and not channel tracks for doors.
 - 3. Wood doors shall be fabricated as detailed. If Formica or other plastic surfaces are used, all sides shall be laminated.
 - 4. Hinged doors shall be mounted on heavy-duty N.S.F. approved hinges, or as noted on plans or specifications.

- C. Hardware:
 - 1. Shall be solid, heavy-duty type.
 - 2. Door hardware shall be locking type, keyed and master keyed.
 - 3. Shall be identified with manufacturer's name and number so that broken or worn parts may be replaced.
 - 4. Submit samples for approval, when requested.
 - 5. Pulls shall be Component Hardware or equal.
- D. Drawer Assemblies:
 - 1. Assemblies shall consist of removable drawer body mounted in a ball bearing slide assembly and padlock assembly.
 - 2. Slide assembly consists of one pair of roller bearing extensions slides with side and back enclosure panels, front spacer angle, two drawer carrier angles secured to slides and stainless steel front.
 - 3. Slides shall be 250-pound capacity made by Component Hardware Co., or equal.
 - 4. Drawer bodies for general storage shall be 20-inch by 20-inch with Royalite containers.
 - 5. Drawers intended to hold food products shall be removable type with 12-inch by 20-inch stainless steel assembly.
 - 6. Drawer fronts are double cased $\frac{3}{4}$ -inch thick, with 18-gauge stainless steel welded and polished front pan. Steel back pan is tightly fitted and tack welded. Sound deaden with rigid insulation.
 - 7. All drawers shall be provided with replaceable soft neoprene bumpers or, for refrigerated drawers, a full perimeter soft gasket.

2.8 FABRICATED WORKMANSHIP

- A. Items of specially fabricated equipment shall be fabricated by an acceptable manufacturer, which is N.S.F. approved and fabricated in an approved manner to the complete satisfaction of the Owner.
 - 1. Welding and Soldering:
 - a. Materials 18-gauge or heavier shall be welded.
 - b. Seams and joints shall be shop welded or soldered as the nature of the material may require.
 - c. Welds shall be ground smooth and polished to match original finish.
 - d. Where galvanizing has been burned off, the weld shall be cleaned and touched up with high-grade aluminum paint.
- B. Fasteners and Joints:
 - 1. The following will not be accepted:
 - a. Exposed screw or bolt heads.
 - b. Rivets.
 - c. Butt joints made by riveting straps under seams and then filled with solder.
- C. Rolled Edges: Rolled edges shall be as detailed, with corners bull nose, ground and polished.
- D. Coved Corners: All stainless steel foodservice equipment shall have $\frac{1}{2}$ -inch or larger radius coves in all horizontal and vertical corners and intersections per N.S.F. standards.
- E. Closures: Where ends of fixtures, splashback, shelves, etc. are open, fill by forming the metal, or weld sections, if necessary, to close entire opening flush to walls or adjoining fixtures.

2.9 OPERATION REQUIREMENTS

- A. Insure quiet operation of foodservice and related equipment.
- B. Insure the bumper gaskets stop and any other needed protection is installed on all fabricated equipment as needed.
- C. Provide controls and system components required for fully function equipment and Kitchen.

2.10 EXHAUST HOODS

- A. Basis-of-Design: CaptiveAire
- B. Install assemblies in the location as indicated on drawings. It is the responsibility of the Installer to verify all clearances and stand offs from the hood to limited-combustibles and/or combustible materials. Hood must be installed in accordance with the Manufacturer's specifications. Canopy Hoods to be installed a minimum of 80 inches above the finished floor.
- C. The hood assembly ends to be fabricated from 16 gauge stainless steel or heavier and have a continuous horizontal Performedge shape at the lower most part of the end. The remainder of the hood will be fabricated of material not less than 18 gauge. All exposed surfaces to be fabricated from Type 304 stainless steel with a #4 finish. All exposed welds to be ground smooth and polished to a #4 finish.
- D. Provide matching stainless steel closure panels to finished ceiling, adjacent walls and spaces between hoods as required.
- E. Rear and side 3" air space(s), if required must be full height of hood assembly and enclosed top, bottom and sides. Assembly shall meet front, side, back overhang requirements per code for capture and containment.
- F. Hood assemblies must be manufactured UL 710 Listed, NFPA 96 compliant and installed in accordance with all prevailing codes and standards.
- G. Hoods to bear a label indicating the exhaust flow rate in cubic feet per minute per lineal foot.
- H. Permit holder shall verify capture and containment performance of the hoods per CMC 511.2.2.2
- I. Hood assembly to be fitted with ExtractAire HVC UL1046 Listed high velocity adjustable slot Cartridge Filters and meets the following construction requirements:
 - 1. Opening at the upper most portion of the top allow air to enter into the filter. Opening to be located within 5" of the top of the hood and be fitted with an adjustable air diverter and choke to control airflow through the cartridge.
 - 2. Designed to force the air traveling through the cartridge to change direction a minimum of five times and 180 degrees.
 - 3. Bottom of filter to be entirely open to allow grease to flow freely out of the cartridge and facilitate hand or dishmachine cleaning and be easily removable without the use of tools.
 - 4. Grease efficiency rating of 55% or higher as certified by an independent testing laboratory and procedure recognized by ASHRAE TC-510.
 - 5. Type 304 stainless steel polished to a #4 finish.
- J. Hood assembly to be constructed with SmartAire Segmented Air Stream Technology that incorporates two adjustable high velocity low volume streams of air into the lower front edge of a hood to enhance the ability to capture and contain cooking gases and effluents, reducing the amount of exhaust air exhausted by up to 40%.

- K. Hood assembly to have a full length internal makeup air plenum in the front of the hood that facilitates an active front edge of the hood, wherein two continuous full length high velocity low volume air streams are incorporated into the inner lower front edge of the hood make up air plenum, one air stream is directed in an inward upward direction and one is directed in a downward inward direction.
 - 1. The air streams will have baffles that are adjustable in individual segments of 18 inches or less.
 - 2. The air streams are supplied by an integral internal fan(s) supplied by the hood assembly and installed in the makeup air plenum.
- L. Internal hood fan to be factory pre-wired to an electrical junction box on top of the hood.
- M. Air inlet to the internal make up air fan will be fitted with a UL Listed fire actuated damper.
- N. Hood assembly to be fitted with Light Duty Containment Panel(s) on open end(s) of Hood.
- O. Panel to be fabricated from 18 gauge stainless steel of the same material and with the same finish as the hood.
- P. Panel to include a continuous double hemmed edge on the front and bottom exposed edges.
- Q. Panel to be easily attached or detached to the side of the hood by means of stainless steel fasteners that screw into recessed non corrosive rib-nuts installed in the side of the hood that do not protrude through the side of the hood.
- R. All welds to be ground smooth and polished to a #4 finish.
- S. Hood assembly to be provided with Model SPD full length add-on supply plenum fabricated of 18 gauge stainless steel that facilitates the delivery of downward supply air through a full length perforated metal panel.
 - 1. All welds to be polished to a #4 finish.
 - 2. Plenum is to be shipped loose and installed in the field.
- T. Hood assembly to be fitted with UL & NSF Listed Surface Mounted Commercial Kitchen Hood light fixtures with lamps.
 - 1. Fixture to have brushed aluminum housing, tempered glass, and shatter resistant globe.
 - 2. Light fixture(s) to be factory pre-wired to a single connection point for each hood section.
 - 3. LED lamp, 120vac, UL Listed for exhaust canopy hoods, 12 Watt, 960 Lumens, 4500K to 5500K, maximum operating temperature 80 degrees C (176°F).
 - 4. 120 degree Beam angle, rated for 50,000 hour lamp life, mercury-free, instant (no ballast).
 - 5. To exceed Federal Energy Act requirement as to not produce ultraviolet light emission.
 - 6. Fits any A19/E26/E27 fixture (globe to be installed in compliance with UL listing).
- U. Hood to be fitted with a UL710 Listed, internally adjustable opposed blade variable volume damper(s).
 - 1. Opposed blades to include a positioning bracket that allows the damper blades to be adjusted from 5% to 100% open.
 - 2. Each positioning bracket to have a locking/unlocking fastener on the inside of the damper that is accessible from inside of the hood that locks the damper blade in place.
 - 3. Damper to be manufactured from 18 gauge stainless.
- V. Hood assembly to be provided with an Auto Fan Start is required for NFPA 96 Section 8.2.3.3
 - 1. Switches may be located in each hood exhaust collar or the hood canopy section.
 - 2. Switches in each canopy to have a maximum spacing of 84 inches.
 - 3. Switches to be installed in Access Enclosure(s) with a removable cover plate that protects and allows access from inside of the hood canopy.

- W. Hood assembly be fitted with UL 710 listed Access Enclosure(s) mounted in the Hood Canopy or Hood Exhaust Collar with a removable cover plate that protects and allows access to monitoring equipment from inside of the hood canopy.
 - 1. Removable cover to be held in place by stainless steel fasteners and allows easy access for installation, adjustments and service to the equipment from inside of the hood canopy.
 - 2. Access Enclosures to be fabricated from 18 gauge stainless steel with all welds ground smooth and polished to a #4 finish.
- X. Hood Utility Cabinet (HUC) assembly mounted to end of Hood assembly per plan.
 - 1. HUC to house Pyro-Chem Fire Suppression System.
 - 2. Constructed with angle iron frame and stainless steel body.
 - 3. All exposed surfaces to be fabricated of 18 gauge Type 304 stainless steel (s/s) with a #4 finish.
 - 4. All exposed welds to be ground smooth and polished to a #4 finish.
 - 5. Cabinet provided with open top to enable utility connections from above ceiling and a stainless steel lift out removable side door panel.
 - 6. Removable door panel to have a recessed s/s door pull, full grip type and held in place by full length upper and lower channels.
 - 7. Grease drip tray and container:
- Y.
 - 1. Full length concealed grease drip tray, kept to the minimum size needed to collect grease below the filters pitched to drain to a fully enclosed metal container with a capacity of less than 1 gallon. For Hoods that exceed 96" provide enclosed metal container on each end of the trough.
- Z.
 - 2. Grease collection container(s) may not protrude below the bottom of the hood.
- AA.
 - 3. Entire length of the grease drip tray to be accessible for easy cleaning.

2.11 FIRE PROTECTION SYSTEM

- A. The fire protection system must be UL 300 Listed , NFPA 17A compliant and installed in accordance with all prevailing codes and standards..
- B. Provide all surface appliance, duct and plenum protection nozzles.
- C. All exposed piping to be stainless steel, chrome plated or sleeved. Run unexposed wherever possible.
- D. All piping must be installed by the Exhaust Hood manufacturer, no exceptions.
- E. No horizontal piping within the canopy
- F. No Exposed fasteners within the canopy
- G. Manual pull station, coordinated with kitchen equipment and layout as approved by Owner.
- H. Assembly shall contain four (4) sets of normally open/closed contact points.
- I. Provide electrically operated fuel gas shut off valve and electrical reset relay, when required, for equipment below hoods. Verify size with Plumbing Division.
- J. Provide Y-Strainer that is approved for the mechanical removal of solids from pressurized gas lines which can be installed in a horizontal or vertical position. The Y Strainer to be manufactured of Carbon Steel and include a removable type 304 stainless steel Strainer with .016 inch perforations (#40 mesh). The Y Strainer to include a removable cap that allows the Strainer to be removed for inspection and/or cleaning when the gas line is not pressurized.

- K. Coordinate with Plumbing Division for the Y-Strainer size and ANSI flanged or threaded pipe connection requirements. Plumbing Division to install the Y Strainer in accordance with the installation instructions
- L. Upon completion the system must be tested and tagged in the presence of the enforcing agency.

2.12 ENCLOSURES

- A. Provide and install enclosure panels secured or removable for any equipment that houses any equipment with movable parts for access. Also, cover and provide protection for any exposed steam line or condensate line that may be within reach of operating personnel.

2.13 ELECTRICAL WORK - GENERAL REQUIREMENTS

- A. Before ordering equipment, confirm with the serving electric utility, all pertinent electrical requirements such as actual voltages available, number of phases and number of wires in the system. Coordinate also with any electrical service provide with other Divisions.
- B. Components and assemblies shall bear the U.L., RU or ETL label or be approved by the prevailing authority.
- C. Custom fabricated and standard refrigerator units shall be provided with vapor tight receptacles, shatterproof lamps and automatic switches. All wiring shall be concealed when possible.

2.14 INSERT PANS

- A. All cut-outs, openings, drawers, or equipment specified or detailed to hold stainless steel insert pans shall be provided with a full compliment of pans as follows:
 - 1. One stainless steel, 20-gauge minimum, solid insert pan for each space, sized per plans, details or specifications.
 - 2. Where pan sizes are not indicated in plans, details or specifications, provide one full size pan for each opening.
 - 3. Provide maximum depth pan to suit application and space.
 - 4. Provide 18-gauge removable stainless steel adapter pars where applicable.

2.15 CORDS AND PLUGS

- A. Where cords and plugs are used, they shall comply with National Electrical Manufacturer's Association (N.E.M.A.) requirements.

PART 3 - EXECUTION

3.1 TRIMMING AND SEALING EQUIPMENT

- A. Any space between units to walls, ceilings, floors and adjoining units, not portable, shall be completely sealed against entrance of food particles or vermin by means of trim strips, welding, soldering, or commercial joint material suitable to the nature of the equipment.
- B. Sealer, when not exposed to extreme heat, shall be silicone construction sealant in appropriate color.
- C. Ends of hollow sections shall be closed.
- D. Enclosed fixtures without legs mounted on masonry bases or floor shall be sealed watertight to base or floor.

END SECTION 11 40 00

SECTION 12 24 13 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Window Roller Shades, enclosures and accessories required for complete installation at both exterior and interior windows (sidelights, transoms and clerestories, but not at glass doors)
- B. Electrically operated, sunscreen w/ 1% shade fabric and blackout roller shades w/ tracked sides for complete blackout. Include local, group and master motor control systems for shade operation with addressable, encoded, electronic drive units (EDU)
 - 1. See room summary for locations.
- C. Electrically operated, sunscreen w/ 1% shade fabric roller shades. Include local, group and master motor control systems for shade operation with addressable, encoded, electronic drive units (EDU)
 - 1. See room summary for locations.
- D. Manually operated shades w/ 1% shade fabric, chain driven with chain retainer.
 - 1. See room summary for locations.
- E. Shade fabric.
 - 1. 1% open shade fabric, maximize width of shade fabric to minimize light gaps between shade fabric

1.3 RELATED SECTIONS

- A. Section 06 10 53 – Miscellaneous Rough Carpentry.
- B. Section 09 29 00 – Gypsum Board.
- C. Section 09 51 23 – Acoustical Ceilings.
- D. Division 26 Sections for electrical service and connections for motor operators, controls, limit switches, and other powered devices and for system disconnect switches for motorized shade operation.

1.4 REFERENCES

- A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- B. NFPA 70 - National Electrical Code.

- C. NFPA 701 - Fire Tests for Flame-Resistant Textiles and Films.
- D. UL 325 - ANSI/CAN/UL Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Provide additional 5 percent of the total length of qualified stainless steel chain required on the project, not to exceed the quantity of one 500'-0" spool.
 - 2. Provide additional 5 percent of each type of shade mounting hardware or brackets, but not less than one pair of each type.
 - 3. Provide a quantity of replacement shade bands completely fabricated and ready to attach to roller tubes equal to 5 percent of the total number of shade bands of each fabric and each color in the largest size required for each of those fabrics.
- B. Clearly label all spare components and supply to City upon completion in original packaging for storage on site by City.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain roller shades through one source from a single manufacturer.
- B. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten years' experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section.
- C. Installer for Roller Shade System - Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years' experience in installing products comparable to those specified in this section.
- D. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Flame-Resistance Ratings: Passes NFPA 701.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use. Individual testing of components will not be acceptable in lieu of system testing.
- F. Product Standard: Provide roller shades complying with WCMA A 100.1.
- G. Requirements for Electronic Hardware, Controls, and Switches: Roller shade hardware, shade fabric, EDU, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.
- H. Requirements for Roller Shade Installer/Contractor:

1. Roller Shade Hardware, shade fabric, motor, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.
2. Roller Shade Installer/Contractor shall list all components and systems included in their bid, including but not limited to, the prime manufacturer of the motor control and automated equipment and shall be financially responsible for any change orders and/or back charges required by the BMS, AV, or Lighting Control Systems contractors to interface with the automatic solar tracking system and the motorized roller shade system.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of roller shade system that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. All operating parts except for the bead chain.
 - b. Shade cloth.
 2. Warranty Period:
 - a. Roller Shade Hardware and chain Warranty: 25 years from date of Substantial Completion.
 - b. Standard Shadecloth: Manufacturer's standard twenty-five year warranty
 - c. PVC-Free Shadecloth: Manufacturer's standard ten year warranty.
 - d. Roller Shade Motors and Motor Control System: Manufacturer's standard non-depreciating five year warranty
 - e. Roller shade installation: One year from date of substantial completion, not including scaffolding, lifts or other means to reach inaccessible areas.
- B. In the event of a warranted product failure, the Shade Contractor shall, at no additional cost to the City, facilitate acquisition and delivery of all necessary replacement components to the City.

1.8 MAINTENANCE

- A. Maintenance Service: Provide as a separate bid amount the cost for annual maintenance contract providing service 'on demand' for repair and maintenance as may be generally anticipated for the conditions of this project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: MechoShade Systems, Inc.; Local representative Kelly Lloyd 650-665-1550, Email: kelly.lloyd@mechoshade.com; Web: <http://www.mechoshade.com>

2.2 ROLLER SHADE TYPES

- A. Roller Shade Schedule:
 1. Manual Shade Type: Manual operating, sunscreen shades with single roller in all exterior windows of rooms and spaces indicated, include the following:

- a. Shade pockets.
- b. Fascias.
- 2. Motorized Shade Type: Motorized operating, sunscreen roller shades in all exterior / interior windows of rooms and spaces indicated, and related EDU control requirements systems. Include the following:
 - a. Shade pockets.
 - b. Fascias.
 - c. Intelligent 2-way communicating line voltage or low voltage, DC motors with low voltage control, dry contact, and serial port, network capability and integration.

2.3 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

- A. Chain-and-clutch operating mechanism: with continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated
 - 1. Bead Chains: stainless steel
 - a. Loop length: full length of roller shade
 - b. Limit Stops: provide upper and lower ball stops
 - c. Chain-retainer type: clip, jamb mount
 - 2. Rollers: Corrosion-resistant steel or extruded aluminum tubes of diameters and wall thickness required to accommodate operating mechanisms and weight and width of shadebands without deflection. Provide permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
 - a. Roller Drive-end location: right side of inside face of shade
 - b. Direction of shadeband roll: regular from back of roller
 - c. Shadeband-to-Roller Attachment: Manufacturer's standard method
 - 3. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories and mounting location and conditions.
 - 4. Roller-Coupling assemblies: coordinate with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly
 - 5. Shadebands:
 - a. Shadeband materials: light-filtering fabric 1% open w/
 - b. Shadeband bottom (hem) bar: steel or extruded aluminum.

2.4 MOTOR-OPERATED, SINGLE-ROLLER SHADES

- A. Motorized Operating Systems: Provide factory-assembled, shade-operator systems of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
 - 1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Electric Motor: Manufacturer's standard tubular, enclosed in rollers.
 - 3. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting.
 - 4. Crank-Operator Override: Crank and gearbox operate shades in event of power

- outage or motor failure.
- 5. Limit Switches: Adjustable switches, interlocked with motor controls and set to stop shade movement automatically at fully raised and fully lowered positions
- 6. Operating Features:
 - a. Group switching with integrated switch control; single faceplate for multiple switch cutouts.
 - b. Override switch.
- B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shades for service.
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.
- D. Shadebands:
 - 1. Shadeband Material: Light-filtering fabric.
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum

2.5 MOTOR-OPERATED, DOUBLE-ROLLER SHADES

- A. Motorized Operating Systems: Provide factory-assembled, shade-operator systems of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
 - 1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Electric Motor: Manufacturer's standard tubular, enclosed in rollers.
 - 3. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting.
 - 4. Crank-Operator Override: Crank and gearbox operate shades in event of power outage or motor failure.
 - 5. Limit Switches: Adjustable switches, interlocked with motor controls and set to stop shade movement automatically at fully raised and fully lowered positions
 - 6. Operating Features:
 - a. Group switching with integrated switch control; single faceplate for multiple switch cutouts.
 - b. Override switch.
- B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shades for service.
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation

accessories, and installation locations and conditions indicated.

- D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- E. Inside Shadebands:
 - 1. Shadeband Material: Light-filtering fabric- 1% open
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
- F. Outside Shadebands:
 - 1. Shadeband Material: Light-blocking fabric
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

2.6 SHADECLOTH

- A. Room Darkening (PVC Free) Shadecloth with Opaque Acrylic Backing, Neutral, graphite color back facing the window:
- B. Environmentally Cradle to Cradle Certified (PVC-Free) Shadecloth: 1 percent open, fabricated from TPO or 100% polyester for both core yarn and jacket, VLT range 1 to 12 percent:
- C. Warranty: 10 year limited warranty.

2.7 SHADE BANDS

- A. Shade Bands: Construction of shade band includes the fabric, the enclosed hem weight, shade roller tube, and the attachment of the shade band to the roller tube.
 - 1. TPO yarn requires use of Exposed hembar for best aesthetic results
 - 2. Concealed Hembar: Shall be continuous extruded aluminum for entire width of shade band and with the following characteristics:
 - a. Hembar shall be heat sealed on all sides.
 - b. Open ends shall not be accepted.
 - 3. Shade band and Shade Roller Attachment:
 - a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection.
 - b. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" Spline mounting, without having to remove shade roller from shade brackets or insert shadeband from the side.
 - c. Mounting Spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.

2.8 ROLLER SHADE COMPONENTS AND REQUIREMENTS

- A. Access and Material Requirements:
 - 1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.

2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
- B. Motorized Shade Hardware and Shade Brackets:
1. Provide shade hardware constructed of minimum 12 gage, 0.105 inch (2.67 mm) thick plated steel, or heavier, as required to support 200 percent of the motor stall torque plastic components without use of steel angle construction do not meet the intent of this specification and shall not be accepted.
 2. Provide shade hardware system that allows for field adjustment of EDU or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
 3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 16 to 45 degrees from the EDU axis between shade bands (8 to 22.5 degrees) on each side of the radial line, by a single shade EDU (multi-banded shade, subject to manufacturer's design criteria).
 4. All bands within a single EDU group shall be aligned within 1/4 inch (6 mm).
- C. Manual Operated Chain Drive Hardware and Brackets:
1. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
 2. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
 3. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band
 4. Provide shade hardware system that allows multi-banded, manually-operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
 5. Provide positive mechanical engagement of the drive mechanism to the shade roller tube. Friction-fit connectors for the drive mechanism connection to the shade roller tube are not acceptable.
 6. Provide shade hardware constructed of minimum 16 gage, 0.060 inch (1.52 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
- D. Drive Bracket / Brake Assembly:
1. The brake shall be an over-running wrapped spring clutch design which disengages during the raising and lowering of a shade. The brake shall withstand a minimum pull force of 50 lbs (22 kg) in the stopped position.
 2. The braking mechanism shall employ an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes a wrapped spring clutch assembly that ensures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated requiring no maintenance. Products that require externally applied lubrication and/or are not permanently lubricated are not acceptable.

3. The entire assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
- E. Drive Chain: No. 10 qualified stainless steel chain rated to 100 lbs (45 kg) minimum breaking strength. Nickel plate chain shall not be acceptable.

2.9 WALL SWITCHES

- A. Wired Wall Switches: Shades shall be operated by 2, 4, 5, 7, or 10 button low voltage standard switches. Standard switch shall be wired to a network interface and be programmed to transmit an address for the local switch. An address that is transmitted by either a switch or central controller shall be responded to by those EDU's with the same address in their control table. Standard switch may control an individual, sub-group or group of EDU's in accordance with the address in each EDU.

2.10 ROLLER SHADE FABRICATION

- A. Product Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade.
- B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
1. Lifting Mechanism: With permanently lubricated moving parts.
- C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
- D. Motorized Shade Hardware and Shade Brackets:
1. Provide shade hardware constructed of minimum 12 gage, 0.105 inch (2.67 mm) thick plated steel, or heavier, as required to support 200 percent of the motor stall torque plastic components without use of steel angle construction do not meet the intent of this specification and shall not be accepted.
 2. Provide shade hardware system that allows for field adjustment of EDU or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
 3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 16 to 45 degrees from the EDU axis between shade bands (8 to 22.5 degrees) on each side of the radial line, by a single shade EDU (multi-banded shade, subject to manufacturer's design criteria).
 4. All bands within a single EDU group shall be aligned within 1/4 inch (6 mm).
- E. Access and Material Requirements:
1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
 2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.

- F. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting roller, and operating hardware and for hardware position and shade mounting method indicated.
- G. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.
- H. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
- I. Colors of Metal and Plastic Components Exposed to View: As selected by Architect and Owner from manufacturer's full range, unless otherwise indicated.

2.11 ACCESSORIES

- A. Roller Shade Pocket: For recessed mounting in drywall ceilings as indicated on the Drawings.
 - 1. Provide either “No-Cost” or Drywall pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.
- B. Pocket Accessories:
 - 1. 2” pocket closure and closure mount for manual shades
 - 2. 3” pocket closure and closure mount for ElectroShades
- C. Fascia:
 - 1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
 - 2. Fascia shall be able to be installed across two or more shade bands in one piece.
 - 3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
 - 4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
 - 5. Fascia shall include a channel for application of flexible material (shlegel) to closing off any light leakage between the fascia and a window frame, mullion, ceiling and/or any other horizontal surface.
 - 6. Fascia shall attach directly to the roller shade bracket without the need to install additional mounting hardware. Exposed fasteners shall not be allowed.
 - 7. Fascia shall positively lock in a top-down installation method to help prevent accidental detachment.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 12 24 13

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SECTION 12 36 40 –COUNTERTOPS

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 SECTION INCLUDES

- A. Quartz-surfacing-material countertops.

1.3 RELATED SECTIONS

- A. Section 06 10 53 – Miscellaneous Rough Carpentry.
- B. Section 06 41 00 – Architectural Woodwork: For interior carpentry exposed to view that is not specified in this Section.
- C. Section 07 92 00 – Joint Sealants.
- D. Division 22: Faucet and plumbing connections.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing architectural solid surfacing similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- C. Forest Certification: Provide components made with not less than 50 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- D. NAAWS Quality Standard: Comply with the specified grade(s) of interior architectural woodwork indicated for construction, finishes, and installation, specified section(s), and applicable requirements of the current edition of the "North American Architectural Woodwork Standards – 3.0, United States Version".
 - 1. Provide WI-certified compliance certificate indicating that countertops comply with requirements of grades specified.

PART 2 - PRODUCTS

2.1 QUARTZ SURFACING

- 1. Basis-of-Design: Zodiac manufactured by DuPont

- B. Quartz Surfacing Composition: 90 percent crushed quartz aggregate combined with resins and pigments and fabricated into slabs.
- C. Dimensions:
 - 1. Thickness: 3/4-inch
 - 2. Slabs Size: Not less than 56.5 x 120 inches (1.44 x 3.05 m) to minimize number of joints in installation.
- D. Sinks: See Plumbing Drawings.
- E. Identification: Label material with batch number by imprinting on back with manufacturer's identifying mark.
- F. Performance Requirements:
 - 1. Flexural Strength: 7,420 psi, ASTM C880/C880M.
 - 2. Compressive Strength: ASTM C170/C170M
 - a. Dry: 10,430 psi average.
 - b. Wet: 11,265 psi average.
 - 3. Izod Impact Strength: 0.361ft. lbs/inch of notch average; ASTM D256.
 - 4. Bond Strength: 205 psi; ASTM C482 modified.
 - 5. Modulus of Rupture: 2,110 average, ASTM C99/C99M.
 - 6. Mohs Hardness: 6.5-7.5; scratch test.
 - 7. Absorption: 0.022%; ASTM C97/C97M.
 - 8. Stain and Acid Resistance: Not affected; ASTM D2299.
 - 9. Surface Burning Characteristics: Flame spread = 10, smoke density = 195; ASTM E84.
 - 10. Thermal Shock Resistance: Passes 5 cycles, 75°F-295°F; ASTM C484.
 - 11. Coefficient of Thermal Expansion: 1.36×10^{-5} inch per °F.; ASTM C531.
 - 12. Weathering Resistance: Not affected after seven days in 1% sulfuric acid; ASTM C217/C217M.
 - 13. Freeze-Thaw Resistance: No visible damage or discoloration after 25 cycles (-45°C to 23°C); S.L.P. with ASTM C62 as guide.
 - 14. Wear Resistance: 36.12 gram average; ASTM C501, tested with 1 kg. load, 1000 cycles at 70 r.p.m.

2.2 COUNTERTOP CONSTRUCTION

- A. Construction:
 - 1. Quality Standard: Comply with NAAWS Section 11.
 - 2. NAAWS Grade: Premium.
 - 3. Solid-Surfacing-Material Thickness: 3/4-inch (19 mm).
 - 4. Single length sections.
 - 5. Intermediate support for spans over 48-inches to prevent deflection in excess of 1/4-inch under a 50 pound per sq ft load.
 - 6. Edge Treatment: In accordance with NAAWS.
 - 7. Back Splash: 4" high typical, In accordance with NAAWS.
 - 8. Back Splash Construction: NAAWS Assembly 2, deck mount, manufacturer-assembled.
 - 9. Adhesive: As approved by manufacturer, able to maintain its bond with the opposing contractions of core and laminate.
 - a. VOC Requirement: Provide adhesive having a VOC content of <70g/L.

10. Joints: Well fit, flush, and watertight.

B. Maximum Unsupported and Unloaded Overhang:

1. Sheet Thickness of 3/4-inch: 12-inches.
2. Sheet Thickness of 1/2-inch: 6-inches.

2.3 COUNTERTOP FABRICATION

A. Fabricate to required profiles and dimensions. To the greatest extent possible, fabricate each unit continuous, without joints and to minimize on-site cutting or other modifications.

B. Fabricate tops in one piece with integral backsplashes and edges, unless otherwise indicated. Comply with quartz-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

C. Complete equipment cut-outs in the shop to greatest extent possible before delivering to site. Allow cut-outs to be made only by the fabricator or installer of the quartz surfacing countertops.

D. Fabricate all surfaces to have uniform gloss. Ease edges and sand smooth.

E. Layout: Layout joints to minimize joints and to avoid L-shaped pieces of quartz surfacing.

F. Inspect Material:

1. Inspect material for defects prior to fabrication.
2. Color Match: Materials throughout Project shall be from the same batch and shall bear labels with same batch number. Visually inspect materials to be used for adjacent pieces to assure acceptable color match. Inspect in lighting conditions similar to those on Project.
3. Variation in distribution of aggregates in quartz surfacing which are within manufacturer's tolerances is not a defect.

G. Tools: Cut and polish with water-cooled power tools.

H. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

I. Cutouts:

1. Cutouts shall have 3/8-inch (10 mm) minimum inside corner radius. Inside corners shall be reinforced in an acceptable manner to prevent cracking.
2. Where edges of cutout will be exposed in finished work, polish edges.

J. Laminations: Laminate layers of quartz surfacing as required to create built-up edges, trim, and other areas requiring additional thickness.

2.4 ACCESSORIES

A. Mounting Adhesives:

1. Provide structural-grade silicone or epoxy adhesives of type recommended by manufacturer for application and conditions of use.
2. Acceptable Silicone Manufacturers: Dow Corning, GE Sealants and Adhesives.

3. Acceptable Epoxy Manufacturers: Akemi North America, Bonstone Material Corporation, Tenax USA.
 4. Provide spacers, if required, of type recommended by adhesive manufacturer.
- B. Joint Adhesive:
1. Provide epoxy or polyester adhesive of type recommend by manufacturer for application and conditions of use.
 2. Color: Tint adhesive which will be visible in finished work to match quartz surfacing.
- C. Joint Sealants:
1. Clear silicone sealant of type recommended by manufacturer for application and conditions of use.
- D. Mildew Resistant Sealant: Specified in Section 07 92 00.
- E. Solvent: Product recommended by adhesive manufacturer to clean surface of quartz surfacing to assure adhesion of adhesives and sealants.
- F. Cleaning Agents: Non-abrasive, soft-scrub type kitchen cleansers.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 12 36 40

SECTION 12 48 16 – ENTRANCE FLOOR GRILLES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Recessed floor grilles and accessories at exterior entry doors. See finish floor plans for location and extent.

1.2 QUALITY ASSURANCE

- A. Accessibility Requirements: Provide installed floor grilles that comply with Sections 302 and 303 in ICC A117.1.
- B. Flammability: ASTM E648, Class 1, Critical radiant flux, min. 0.45 watts/m²
- C. Slip resistance: ASTM D-2047-96. Coefficient of Friction, minimum 0.60, when tested in wet conditions
- D. Rolling load: 400 lb./wheel
- E. Single Source Responsibility: Obtain floor grids and frame from one source of a single manufacturer.
- F. Utilize a manufacturer that is ISO 9001 & 14001 certified.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum – ASTM B221 alloy 6105*T5 for rail extrusions and 6061-T6 for key lock bars
- B. Tread Insert: CRI Standard for good indoor air quality; Fibers shall include a minimum of 100, 12 mil monofilament fibers per square inch. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous splice-free lengths; anti-static carpet fibers; antimicrobial; carpet weight 33-oz./yd

2.2 FLOOR GRILLES

- A. Basis-of-Design : CS Pedigrid G1, aluminum level base frame, heavy-duty carpet insert, heel proof.
- B. General: Provide manufacturer's standard floor-grille assemblies consisting of treads of type and profile indicated, interlocked or joined together by cross members, and with support legs (if any) and other components needed to produce a complete installation.
- C. Provide colors, patterns, finishes, and profiles of materials indicated or as selected by the Architect and Owner from manufacturer's standards.

- D. Extruded Aluminum: ASTM B221, alloy 6063-T5 with natural mill finish.
- E. Recessed Mat Frames: Extruded aluminum frame members, not less than 1 inch wide, with mitered corners and finish to match mat. Provide size and style to fit floor mat with anchorage devices required.

2.3 FABRICATION

- A. Shop-fabricate floor grilles to greatest extent possible in sizes as indicated. Unless otherwise indicated, provide each grille as a single unit; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in grilles are necessary, space symmetrically and away from normal traffic lanes.
- B. Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 12 48 16