



ARCHITECTS

Capital Bank Plaza

333 Fayetteville Street, Suite 225

Raleigh NC 27601

PROJECT MANUAL

VOLUME 2 of 3

Divisions 03 thru 19

Architect's Project Number: 02020.300

Johnsonville Elementary School Addition/Renovation

18495 NC Hwy 27 West

Cameron, NC 28326

Harnett County Schools

1008 South 11th Street

Lillington, North Carolina 27546

December 15, 2020

Construction Documents



Set Number: _____

SECTION 00 01 01

PROJECT TITLE PAGE

Date December 15, 2020
Construction Documents

Project Identification Johnsonville Elementary School Addition/Renovation
18495 NC Hwy 27 West
Cameron, NC 28326

Architect Project No.: 02020.300

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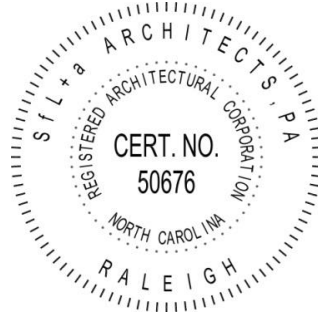
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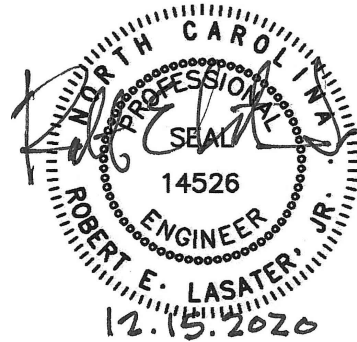
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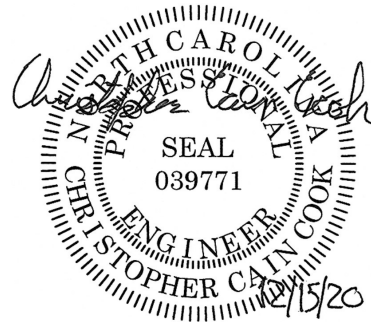
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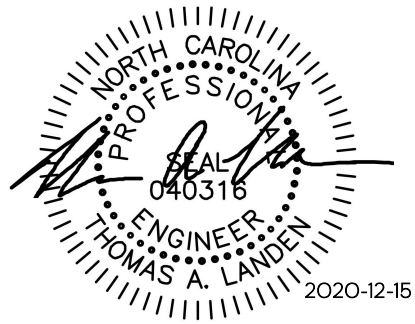


Fire Protection Engineering
Plumbing Engineering

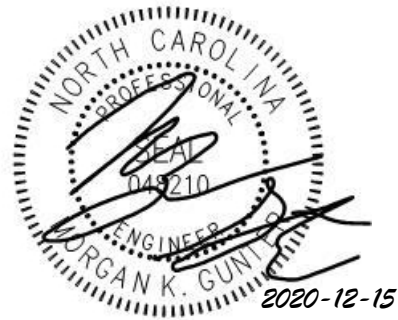
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SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Formwork for cast-in place concrete.
 - 2. Shoring, bracing, and anchorage.
 - 3. Form accessories.
 - 4. Form stripping.
- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete.
 - 2. Section 04 20 00 - Unit Masonry: Product requirements for masonry accessories for placement by this Section.
 - 3. Section 05 50 00 - Metal Fabrications: Product requirements for metal fabrications for placement by this Section.

1.3 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications for Structural Concrete.
 - 3. ACI 318 - Building Code Requirements for Structural Concrete.
 - 4. ACI 347 - Guide to Formwork for Concrete.
- B. American Forest and Paper Association:
 - 1. AF&PA - National Design Specifications for Wood Construction.
- C. The Engineered Wood Association:
 - 1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.
- D. ASTM International:
 - 1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - 2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
 - 1. Submit formwork, shoring, and reshoring shop drawings.
 - 2. Indicate the following:
 - a. Pertinent dimensions, openings, methods of construction, types of connections, materials, joint arrangement and details, ties and shores, location of framing, studding and bracing, and temporary supports.

- b. Sequence and timing of erection and stripping assumed compressive strength at time of stripping, height of lift and height of drop during placement.
 - c. Procedure and schedule for removal of shores and installation and removal of re-shores.
- C. Product Data: Submit data on void form materials and installation requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347, ACI 301 and ACI 318.
- B. For wood products furnished for work of this Section, comply with AF&PA.

1.6 QUALIFICATIONS

- A. Design formwork under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of North Carolina.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Products storage and handling requirements.
- B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

- A. Form Materials: At discretion of Contractor.
- B. Lumber Forms:
 - 1. Application: Use for edge forms and unexposed finish concrete.
 - 2. Boards: 6 inches or 8 inches in width, ship lapped or tongue and groove, "Standard" Grade Douglas Fir, conforming to WCLIB Standard Grading Rules for West Coast Lumber. Surface boards on four sides.
- C. Plywood Forms:
 - 1. Application: Use for exposed finish concrete.
 - 2. Forms: Conform to PS 1; full size 4 x 8 feet panels; each panel labeled with grade trademark of APA/EWA.
 - 3. Plywood for Surfaces to Receive Membrane Waterproofing: Minimum of 5/8 inch thick; APA/EWA "B-B Plyform Structural I Exterior" grade.
 - 4. Plywood where "Smooth Finish" is required, as indicated on Drawings: APA/EWA "HD Overlay Plyform Structural I Exterior" grade, minimum of 3/4 inch thick.

2.2 PREFABRICATED FORMS

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

2.3 FORMWORK ACCESSORIES

- A. Form Release Agent: Colorless mineral oil that will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- B. Bituminous Joint Filler: ASTM D1751.
- C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
- C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Earth Forms:
 - 1. Trench earth forms neatly, accurately, and at least 2 inches wider than footing widths indicated on Drawings.
 - 2. Trim sides and bottom of earth forms.
 - 3. Construct wood edge strips at top of each side of trench to secure reinforcing and prevent trench from sloughing.
 - 4. Form sides of footings where earth sloughs.
 - 5. Tamp earth forms firm and clean forms of debris and loose material before depositing concrete.
- C. Formwork - General:
 - 1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
 - 2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
 - 3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
 - 4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
 - 5. Complete wedging and bracing before placing concrete.
- D. Forms for Smooth Finish Concrete:
 - 1. Use steel, plywood or lined board forms.
 - 2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.

3. Install form lining with close-fitting square joints between separate sheets without springing into place.
 4. Use full size sheets of form lines and plywood wherever possible.
 5. Tape joints to prevent protrusions in concrete.
 6. Use care in forming and stripping wood forms to protect corners and edges.
 7. Level and continue horizontal joints.
 8. Keep wood forms wet until stripped.
- E. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301 and ACI 318.
- F. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

3.4 APPLICATION - FORM RELEASE AGENT

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- C. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- D. Do not apply form release agent where concrete surfaces are indicated to receive finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- E. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

3.5 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install formed openings for items to be embedded in or passing through concrete work.
- C. Locate and set in place items required to be cast directly into concrete.
- D. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- E. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- F. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- G. Construction Joints:
1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
 2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
 3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
 4. Arrange joints in continuous line straight, true and sharp.
- H. Embedded Items:
1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.

2. Do not embed wood or uncoated aluminum in concrete.
 3. Obtain installation and setting information for embedded items furnished under other Specification sections.
 4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
 5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.
- I. Openings for Items Passing Through Concrete:
1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
 2. Coordinate work to avoid cutting and patching of concrete after placement.
 3. Perform cutting and repairing of concrete required as result of failure to provide required openings.
- J. Screeds:
1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
 2. Slope slabs to drain where required or as shown on Drawings.
 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.
- K. Screenshot Supports:
1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane.
 2. Staking through membrane is not be permitted.

3.6 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Architect/Engineer.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Leave forms in place for minimum number of days as specified in ACI 347.

3.8 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Construct formwork to maintain tolerances required by ACI 301 and ACI 318.

3.9 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting and testing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- C. Notify Architect/Engineer after placement of reinforcing steel in forms, but prior to placing concrete.
- D. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

SECTION 03 20 00
CONCRETE REINFORCING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Reinforcing bars.
 - 2. Welded wire fabric.
 - 3. Reinforcement accessories.
- B. Related Sections:
 - 1. Section 03 10 00 - Concrete Forming and Accessories.
 - 2. Section 03 30 00 - Cast-In-Place Concrete.
 - 3. Division 26 - Electrical as related to bonding and grounding requirements.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 301 - Specifications for Structural Concrete, 2016.
 - 2. ACI 318 - Building Code Requirements for Structural Concrete, 2014.
 - 3. ACI SP-66 - ACI Detailing Manual, 2004.
- B. ASTM International (ASTM):
 - 1. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement, 2016.
 - 2. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete, 2017.
- C. American Welding Society (AWS):
 - 1. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel.
 - 2. AWS D1.1/D1.1M - Structural Welding Code - Steel
- D. Concrete Reinforcing Steel Institute (CRSI):
 - 1. CRSI (DA4) - Manual of Standard Practice.
 - 2.
- E. The Masonry Society (TMS):
 - 1. TMS 402/602 - Building Code Requirements and Specification For Masonry Structures; 2016.

1.3 COORDINATION

- A. Division 01 Administrative Requirements: Coordination and project conditions.
- B. Coordinate with placement of formwork, formed openings and other Work.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Indicate bar sizes, spacings, locations, and quantities of reinforcing steel, bending and cutting schedules, and supporting and spacing devices.
- C. Certificates:

1. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
2. AWS qualification certificate for welders employed on the Work.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI (DA4), ACI 301 and ACI 318.
 1. Maintain one copy of each document on project site.

1.6 QUALIFICATIONS

- A. Welders: Certified as AWS qualified within previous 12 months.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Deformed Reinforcement: ASTM A615/A615M; 60 ksi yield strength, steel bars, unfinished.
- B. Welded Plain Wire Fabric: ASTM A1064/A1064M; in flat sheets or coils; unfinished.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic tipped steel type; size and shape to meet Project conditions.

2.3 FABRICATION

- A. Fabricate concrete reinforcement in accordance with CRSI (DA4).
- B. Form standard hooks for 90 degree bend as indicated on Drawings.
- C. Form reinforcement bends with minimum diameters in accordance with ACI 318.
- D. Fabricate column reinforcement with offset bends at reinforcement splices.
- E. Welding of reinforcement is not permitted, unless indicated on Drawings or approved by Architect.
 1. If welding of reinforcement is indicated on Drawings or otherwise approved by Architect, perform welding in accordance with AWS D1.4/D1.4M.
 2. Galvanized or Epoxy Coated Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI (DA4).
- F. Locate reinforcement splices not indicated on Drawings, at point of minimum stress. Review location of splices with Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 PLACEMENT

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.
 - 1. Do not weld crossing reinforcement bars for assembly.
- C. Do not displace or damage vapor barrier.
- D. Accommodate placement of formed openings.
- E. Space reinforcement bars with minimum clear spacing in accordance with ACI 318, but not less than 1 inch.
 - 1. Where bars are indicated in multiple layers, place upper bars directly above lower bars.
- F. Maintain concrete cover around reinforcement in accordance with ACI 318.
- G. Splice reinforcing where indicated on Drawings in accordance with splicing device manufacturer's instructions.
- H. Bond and ground all reinforcement to requirements of Division 26 - Electrical as related to bonding and grounding requirements.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements.
- B. Install reinforcement within the tolerances specified in TMS 402/602 for foundation walls.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting and testing.
- B. Field inspection and testing will be performed by Owner's testing laboratory in accordance with ACI 318.
- C. Provide free access to Work and cooperate with appointed firm.
- D. Reinforcement Inspection:
 - 1. Placement Acceptance: Specified and ACI 318 material requirements and specified placement tolerances.
 - 2. Welding: Inspect welds in accordance with AWS D1.1/D1.1M.
 - 3. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete for the following:
 - 1. Slabs on grade.
 - 2. Footings.
 - 3. Concrete stairs
 - 4. Mechanical equipment pads and housekeeping pads.
 - 5. Control, expansion and contraction joint devices.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 305 - Hot Weather Concreting.
 - 3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 - 4. ACI 308.1 - Standard Specification for Curing Concrete.
 - 5. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
 - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 2. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 3. ASTM C33 - Standard Specification for Concrete Aggregates.
 - 4. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 5. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - 6. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 - 7. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
 - 8. ASTM C150 - Standard Specification for Portland Cement.
 - 9. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
 - 10. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 - 11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - 12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 - 13. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
 - 14. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
 - 15. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
 - 16. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - 17. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.
 - 18. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.

19. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
20. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
21. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
22. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
23. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
24. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
25. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
26. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
27. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
28. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
29. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
30. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
31. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
32. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
33. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
34. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.3 PERFORMANCE REQUIREMENTS

- A. Vapor Barrier Permeance: testing results from ASTM F 1249 or ASTM E 96 must state a water vapor transmission rate (WVTR) of less than 0.01 perms (grains/[hour * ft² * in. Hg])

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on joint devices, attachment accessories and admixtures.
- C. Design Data:
 1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
 - a. Hot and cold weather concrete work.
 - b. Air entrained concrete work.
 2. Identify mix ingredients and proportions, including admixtures.
 3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.
- D. Manufacturer's Installation Instructions: Submit installation procedures and interface required with adjacent Work.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01770 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and ACI 318.
- B. Conform to ACI 305 when concreting during hot weather.
- C. Conform to ACI 306.1 when concreting during cold weather.
- D. Acquire cement and aggregate from one source for Work.

1.7 COORDINATION

- A. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, and as follows:
 - 1. Type I, except where other type is specifically permitted or required.
 - a. Type I may be replaced by Type III (high early strength) for concrete placed during cold weather.
- B. Fly Ash: ASTM C 618, Type C or F.
 - 1. Maximum allowable loss on ignition: 4.0 percent.
- C. Water: Potable.
- D. Aggregates:
 - 1. Normal weight concrete: ASTM C 33, uniformly graded as follows:
 - a. Class: Moderate weathering region, but not less than 3M
 - b. Nominal Maximum Aggregate Size:
 - 1) Slabs on Grade: 1-inch.
 - 2) Footings and Walls: 3/4-inch.
 - 2. Lightweight Aggregate: ASTM C330, 3/4-inch nominal maximum aggregate size.
- E. Admixtures - General: Admixtures which result in more than 0.1 percent of soluble chloride ions by weight of cement are prohibited.
- F. Air-Entraining Admixture: ASTM C 260 and certified by manufacturer for compatibility with other mix components.
- G. Water-Reducing Admixture: ASTM C 494, Type A.
- H. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.
- I. Water-Reducing and Accelerating Admixtures: ASTM C 494, Type E.

2.2 REINFORCEMENT

- A. Deformed Reinforcement: ASTM A615/A615M; 60 ksi yield strength, steel bars, unfinished.

2.3 REINFORCEMENT ACCESSORY MATERIALS

- A. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.
- B. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic tipped steel type; size and shape to meet Project conditions.

2.4 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Vapor Barrier
 - 1. Vapor barrier must have all of the following qualities:
 - a. Permeance of less than 0.01 Perms [grains/(ft² · hr · inHg)] as tested in accordance with ASTM E 1745 Section 7.1.
 - b. Other performance criteria:
 - 1) Strength: ASTM E 1745 Class A.
 - 2) Thickness: 15 mils
 - c. Manufactured from prime virgin resins.
 - 2. Seam Tape: Manufacturer's recommended low permeance tape composed of a high-density polyethylene film and a rubber based, pressure-sensitive adhesive.
- B. Nonshrink Grout: ASTM C 1107.
 - 1. Type: Provide nonmetallic type only.
 - 2. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:
 - a. Nonmetallic type:
 - 1) "Masterflow 928"; Master Builders, Inc.
 - 2) "SonogROUT 14k"; Sonneborn Building Products Division/ChemRex, Inc.
 - 3) "Euco N-S Grout"; The Euclid Chemical Company.
 - 4) "Supreme"; Cormix Construction Chemicals.
 - 5) "Crystex"; L & M Construction Chemicals, Inc.
 - 6) "Sure-Grip High Performance Grout"; Dayton Superior Corporation.
 - 7) "Horn Non-Corrosive Non-Shrink Grout"; A. C. Horn, Inc.
 - 8) "Five Star Grout"; Five Star Products, Inc.
- C. Burlap: AASHTO M 182, Class 2 jute or kenaf cloth.
- D. Moisture-Retaining Cover: ASTM C 171, and as follows:
 - 1. Curing paper.
 - 2. Polyethylene film.
 - 3. White burlap-polyethylene sheeting.
- E. Liquid Curing Compounds:
 - 1. Manufacturers: Provide products complying with requirements of the contract documents and made by one of the following:
 - a. Master Builders, Inc.
 - b. Anti Hydro International, Inc.
 - c. The Euclid Chemical Company.
 - d. A. C. Horn, Inc.
 - e. Dayton Superior Corporation.
 - f. W. R. Meadows, Inc.
 - g. The Burke Company.
 - h. Sonneborn Building Products Division/ChemRex, Inc.

- i. L & M Construction Chemicals, Inc.
 - j. Setcon Industries, Inc.
 - k. Cormix, Inc.
 2. Material - curing compounds: Comply with ASTM C 309, Type 1.
 - a. Non-yellowing formulation where subject to ultraviolet light.
 - b. Where compounds are proposed for use on surfaces to which finishes, coatings, or coverings subsequently will be applied, compound shall possess demonstrated compatibility with finish, coating, or covering, and use shall be subject to approval of the architect.
 - c. Curing and sealing compound: Where indicated, provide curing and sealing formulation with long-lasting finish that is resistant to chemicals, oil, grease, deicing salts, and abrasion.
 3. Solvents: Water-based products where used on interior surfaces.
- F. Self-Expanding Strip Waterstops: Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophylic material for adhesive bonding to concrete.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Volclay Waterstop-RX;
 - b. Colloid Environmental Technologies Co.
 - c. Conseal CS-231; Concrete Sealants Inc.
 - d. Swellseal Joint; De Neef Construction Chemicals (U.S.) Inc.
 - e. Hydrotite; Greenstreak.
 - f. Mirastop; Mirafi Moisture Protection, Div. of Royal Ten Cate (USA), Inc.
 - g. Adeka Ultra Seal; Mitsubishi International Corporation.
 - h. Superstop; Progress Unlimited Inc.
- G. Underlayment Compound: Self-leveling cementitious compound designed for pumping.
 1. Products: Provide one of the following:
 - a. "Flo-Top"; The Euclid Chemical Company.
 - b. "Thoro Underlayment Self-Leveling"; Thoro System Products Division/ICI Americas.
- H. Expansion Joint Filler:
 1. Interior - Nonextruding bituminous type: ASTM D 1751.
 2. Exterior - Sponge rubber type: ASTM D 1752, Type I.

2.5 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 1. Fly Ash: 25 percent, for concrete exposed to weather.
- C. Limit water-soluble, chloride-ion content in hardened concrete, measured by percent by weight of cement, as follows:
 1. Concrete slabs exposed to weather. 0.30.
 2. Concrete protected from weather: 1.00.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete and concrete with a water-cementitious materials ratio below 0.50.

2.6 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
 1. Minimum Compressive Strength: 3000 psi at 28 days.
 2. Slump Limit: 4 inches, plus or minus 1 inch.
- B. Slabs-on-Grade, protected from weather: Proportion normal-weight concrete mixture as follows:
 1. Minimum Compressive Strength: 3000 psi at 28 days.
 2. Minimum Cementitious Materials Content: 520 lb/cu. yd. for 1 inch maximum aggregate size or 540 lb/cu. yd. for $\frac{3}{4}$ inch maximum aggregate size.
 3. Slump Limit: 4 inches, plus or minus 1 inch.
 4. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.
- C. Slabs-on-Grade, exposed to weather: Proportion normal-weight concrete mixture as follows:
 1. Minimum Compressive Strength: 4500 psi at 28 days.
 2. Minimum Cementitious Materials Content: 520 lb/cu. yd. for 1 inch maximum aggregate size; 540 lb/cu. yd. for $\frac{3}{4}$ inch maximum aggregate size.
 3. Slump Limit: 4 inches, plus or minus 1 inch.
 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch or $\frac{3}{4}$ -inch nominal maximum aggregate size.
 5. Water-Cementitious ratio: 0.40.

2.7 CONTROL OF MIX IN THE FIELD

- A. Slump: A tolerance of up to 1 inch above approved design mix slump will be permitted for 1 batch in 5 consecutive batches tested. Concrete of lower slump than that specified may be used, provided proper placing and consolidation is obtained.
- B. Total Air Content: A tolerance of plus or minus 1-1/2 percent of approved design mix air content will be allowed for field measurements.
- C. Do not use batches that exceed tolerances.

2.8 CONCRETE MIXING

- A. Transit Mixers: Mix concrete materials in transit mixers, complying with requirements of ASTM C 94.
 1. At ambient temperatures of 85 to 90 degrees F, reduce mixing and delivery time to 75 minutes.
 2. At ambient temperatures above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 013100 - Administrative Requirements: Coordination and project conditions.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- C. Remove debris and ice from formwork, reinforcement, and concrete substrates.
- D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301 and ACI 318.
- B. Notify testing laboratory and Architect/Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
- D. Install vapor barrier under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight by taping edges and ends.
- E. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches and seal watertight.
- F. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- G. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.
- H. Install joint covers in longest practical length, when adjacent construction activity is complete.
- I. Apply sealants in joint devices in accordance with Section 07920.
- J. Deposit concrete at final position. Prevent segregation of mix.
- K. Place concrete in continuous operation for each panel or section determined by predetermined joints.
- L. No free falls in excess of 3 feet shall be permitted. For falls in excess of 3 feet, chutes or elephant trunks shall be employed.
- M. Concrete shall be thoroughly compacted during placing and thoroughly worked around reinforcing and embedded fixtures and into the corners of the form. Vibration shall be employed to aid the compaction of the concrete under experienced supervision. Forms shall be designed to withstand their action. Supplement vibration by spading. No forking and/or raking shall be permitted. At least one spare vibrator shall be on hand for emergency use.
- N. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- O. Place concrete continuously between predetermined expansion, control, and construction joints.
- P. Do not interrupt successive placement; do not permit cold joints to occur.
- Q. No concrete that has partially hardened, become contaminated by foreign materials, or has been re-tempered shall be deposited.
- R. Place floor slabs in saw cut pattern indicated.

- S. Saw cut joints within 12 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.
- T. Screed floors and slabs on grade level, maintaining surface flatness of maximum ¼ inch in 10 ft.
- U. Provide control joints in concrete terrazzo flooring per NTMA recommendations and as follows: Provide control joints at no more than 6'-0" on center. Provide control joints at all corner locations. Coordinate joint locations with Architectural documents.
- V. For pumped concrete, grout used to prime the pump shall be not be used on the project.

3.4 FINISHING FORMED SURFACES

- A. Repairs, General: Repair surface defects, including tie holes, immediately after removing formwork.
 - 1. Remove honeycombed areas and other defective concrete down to sound concrete, cutting perpendicular to surface or slightly undercutting. Dampen patch location and area immediately surrounding it prior to applying bonding compound or patching mortar.
 - 2. Before bonding compound has dried, apply patching mixture matching original concrete in materials and mix except for omission of coarse aggregate, and using a blend of white and normal portland cement as necessary to achieve color match. Consolidate thoroughly and strike off slightly higher than surrounding surface.
- B. Unexposed Form Finish: Repair tie holes and patch defective areas. Rub down or chip off fins or other raised areas exceeding 1/4 inch height.
- C. Exposed Form Finish: Repair and patch defective areas, with fins or other projections completely removed and smoothed.
 - 1. Smooth rubbed finish: Apply to surfaces indicated no later than 24 hours after form removal.
 - a. Wet concrete surfaces to be finished and rub with Carborundum brick or other abrasive until uniform color and texture are achieved.
 - b. Do not apply separate grout mixture.
 - 2. Contiguous unformed surfaces: Strike smooth and float to a similar texture tops of walls, horizontal offsets, and other unformed surfaces adjacent to or contiguous with formed surfaces. Continue final finish of formed surfaces across unformed surfaces, unless otherwise specifically indicated.

3.5 FINISHING SLABS

- A. Finishing Operations - General:
 - 1. Do not directly apply water to slab surface or dust with cement.
 - 2. Use hand or powered equipment only as recommended in ACI 302.1R.
 - 3. Screeding: Strikeoff to required grade and within surface tolerances indicated. Verify conformance to surface tolerances. Correct deficiencies while concrete is still plastic.
 - 4. Bull Floating: Immediately following screeding, bull float or darby before bleed water appears to eliminate ridges, fill in voids, and embed coarse aggregate. Recheck and correct surface tolerances.
 - 5. Do not perform subsequent finishing until excess moisture or bleed water has disappeared and concrete will support either foot pressure with less than 1/4-inch indentation or weight of power floats without damaging flatness.
 - 6. Final floating: Float to embed coarse aggregate, to eliminate ridges, to compact concrete, to consolidate mortar at surface, and to achieve uniform, sandy texture. Recheck and correct surface tolerances.

7. Troweling: Trowel immediately following final floating. Apply first troweling with power trowel except in confined areas, and apply subsequent trowelings with hand trowels. Wait between trowelings to allow concrete to harden. Do not over trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over it. Consolidate concrete surface by final troweling operation. Completed surface shall be free of trowel marks, uniform in texture and appearance, and within surface tolerance specified.
 8. Grind smooth surface defects which would telegraph through final floor covering system.
- B. Coordinate appearance and texture of required final finishes with the architect before application.
- C. Float Finish: As specified above.
- D. Broomed Float Finish: After floating and when water sheen has practically disappeared, apply uniform transverse corrugations approximately 1/16 inch deep, without tearing surface.
- E. Trowel Finish: As specified above.
- F. Trowel and Fine Broom Finish: Follow trowel finishing operation immediately with fine brooming to achieve slightly scarified surface.
- G. Slab Surface Tolerances:
1. Achieve flat, level planes except where grades are indicated. Slope uniformly to drains.
 2. Floated finishes: Depressions between high spots shall not exceed 1/4 inch under a 10-foot straightedge.
 3. Troweled finishes: Achieve level surface plane so that depressions between high spots do not exceed the following dimension, using a 10-foot straightedge:
 - a. 1/8 inch non-cumulative in any direction and equivalent to F_F50 (floor flatness), F_L35 (floor levelness) at areas to receive wood flooring and special sports flooring as noted in Division 9.
 - b. 3/16 inch all others receiving troweled finishes.
- H. Slab Finish Schedule: Apply finishes in the following typical locations and as otherwise shown on the drawings:
1. Float finish:
 - a. Surfaces to receive thickset stone flooring
 2. Broomed float:
 - a. Sidewalks.
 - b. Exterior slabs not otherwise scheduled.
 3. Trowel finish:
 - a. Exposed interior floors not otherwise scheduled.
 - b. Surfaces to receive resilient tile.
 - c. Surfaces to receive carpet.
 4. Trowel and fine broom:
 - a. Surfaces to receive thinset tile.
 5. Finish of all slabs to receive terrazzo shall be coordinated with terrazzo installer.
- I. Repair of Slab Surfaces: Test slab surfaces for smoothness and to verify surface plane to tolerance specified. Repair defects as follows:
1. High areas: Correct by grinding after concrete has cured for not less than 14 days.
 2. Low areas: Immediately after completion of surface finishing operations, cut out low areas and replace with fresh concrete. Finish repaired areas to blend with adjacent

- concrete. Proprietary patching compounds may be used when approved by the architect.
- 3. Crazed or cracked areas: Cut out defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts. Dampen exposed concrete and apply bonding compound. Mix, place, compact, and finish patching concrete to match adjacent concrete.
- 4. Isolated cracks and holes: Groove top of cracks and cut out holes not over 1 inch in diameter. Dampen cleaned concrete surfaces and apply bonding compound; place dry pack or proprietary repair compound acceptable to architect while bonding compound is still active:
 - a. Dry-pack mix: One part portland cement to 2-1/2 parts fine aggregate and enough water as required for handling and placing.
 - b. Install patching mixture and consolidate thoroughly, striking off level with and matching surrounding surface. Do not allow patched areas to dry out prematurely.
- 5. Underlayment: Leveling of slabs for subsequent application of floor finishes may be achieved by use of specified underlayment material, at contractor's option.
- J. Surface Sealer: Apply to all interior concrete slabs to remain exposed.
 - 1. Allow concrete to cure for 30 days prior to application of sealer.
 - 2. Use clear solvent base, 100% solid epoxy sealer similar to Tamms Duraltex 1705. Apply two coats. Follow manufacturers recommendation for surface preparation.

3.6 CONCRETE CURING AND PROTECTION

- A. General:
 - 1. Prevent premature drying of freshly placed concrete, and protect from excessively cold or hot temperatures until concrete has cured.
 - 2. Provide curing of concrete by one of the methods listed and as appropriate to service conditions and type of applied finish in each case.
- B. Normal Curing Period:
 - 1. Not less than 7 days for standard cements and mixes.
 - 2. Not less than 4 days for high early strength concrete using Type III cement.
- C. Formed Surfaces: Cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed.
 - 1. Keep wooden or metal forms moist when exposed to heat of the sun.
 - 2. If forms are removed prior to completion of curing process, continue curing by one of the applicable methods specified.
- D. Surfaces Not in Contact with Forms:
 - 1. Start initial curing as soon as free water has disappeared, but before surface is dry.
 - 2. Keep continuously moist for not less than 7 days by uninterrupted use of any of the following:
 - a. Water ponding.
 - b. Water-saturated sand.
 - c. Water-fog spray.
 - d. Saturated burlap: Provide 4-inch minimum overlap at joints.
 - 3. Begin final curing procedures immediately following initial curing and before concrete has dried.
 - a. Moisture-retaining cover: Lap not less than 3 inches at edges and ends, and seal with waterproof tape or adhesive. Repair holes or tears during curing period with same tape or adhesive. Maintain covering in intimate contact with concrete surface. Secure to avoid displacement.

- 1) Extend covering past slab edges at least twice the thickness of slab.
 - 2) Do not use plastic sheeting on surfaces which will be exposed to view when in service.
 - b. Curing compound: Apply at rate stated by manufacturer to conform with moisture-retention requirements specified, using second, immediate application at right angles to first, if necessary, and reapply if damaged by rain.
 - c. Curing and sealing compound: Apply at rate stated by manufacturer to conform with moisture-retention requirements specified, using second, immediate application at right angles to first, if necessary, and reapply if damaged by rain. Apply additional coat near substantial completion to act as sealer.
 - d. Use curing compounds only in locations permitted or required, and where use will not interfere with other finishes, coatings, or coverings to be applied.
4. Continue final curing to end of curing period.
- E. Avoid rapid drying at end of curing period.
- F. During and following curing period, protect concrete from temperature changes of adjacent air in excess of 5 degrees F per hour and 50 degrees F per 24 hours. Progressively adjust protective measures to provide uniform temperature changes over entire concrete surface.

3.7 MISCELLANEOUS CONCRETE ITEMS

- A. Fill-in: Fill in holes and openings left in concrete structures for passage of work by other trades after such work is in place. Place such fill-in concrete to blend with existing construction, using same mix and curing methods.
- B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as indicated on drawings. Set anchor bolts at correct elevations, complying with diagrams or templates of equipment manufacturer.
 1. Grout base plates and foundations as indicated with nonshrink grout.
 2. Use nonmetallic grout for exposed conditions, unless otherwise indicated.
- C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Screed, tamp, and finish concrete surfaces as scheduled.
- D. Reinforced Masonry: Provide concrete grout for reinforced masonry where indicated on drawings and as scheduled.

3.8 CONCRETE REPAIRS

- A. Perform cosmetic repairs of concrete surfaces as specified under concrete application.
- B. Perform structural repairs with prior approval of the architect for method and procedure, using epoxy bonding systems. The architect's approval is required for repair methods using materials other than those specified.

3.9 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. Composite Sampling, and Making and Curing of Specimens: ASTM C 172 and ASTM C 31.
 1. Take samples at point of discharge.
 2. For pumped concrete, perform sampling and testing at the frequencies specified herein at point of delivery to pump, and perform additional sampling and testing at the same

frequency at discharge from line. Results obtained at discharge from line shall be used for acceptance of concrete.

- B. Slump: ASTM C 143. One test per strength test and additional tests if concrete consistency changes.
 - 1. Modify sampling to comply with ASTM C 94.
- C. Air Content of Normal Weight Concrete: ASTM C 173 or ASTM C 231. One test per strength test performed on air-entrained concrete.
- D. Air Content of Lightweight Concrete: ASTM C 173. One test per strength test performed on air-entrained concrete.
- E. Approximate Air-Dry Weight of Lightweight Concrete: ASTM C 567. Determine fresh unit weight once per strength test and report approximate air-dry weight of concrete represented.
- F. Concrete Temperature:
 - 1. Test hourly when air temperature is 40 degrees F or below.
 - 2. Test hourly when air temperature is 90 degrees F or above.
 - 3. Test each time a set of strength test specimens is made.
- G. Compressive Strength Tests: ASTM C 39.
 - 1. Compression test specimens: Mold and cure one set of 4 standard cylinders for each compressive strength test required.
 - 2. Testing for acceptance of potential strength of as-delivered concrete:
 - a. Obtain samples on a statistically sound, random basis.
 - b. Minimum frequency:
 - 1) One set per 100 cubic yards or fraction thereof for each day's pour of each concrete class.
 - 2) One set per 3500 square feet of slab or wall area or fraction thereof for each day's pour of each concrete class.
 - 3) When less than 5 cubic yards is placed in one day, the architect may, at architect's option, waive laboratory testing of specimens if adequate evidence of satisfactory strength is provided. (Molding and curing of these specimens is not waived.)
 - 4) When the above testing frequency would provide fewer than 5 strength tests for a given class of concrete during the project, conduct testing from not less than 5 randomly selected batches, or from each batch if fewer than 5.
 - c. Test one specimen per set at 7 days for information unless an earlier age is required.
 - d. Test 2 specimens per set for acceptance of strength potential; test at 28 days unless other age is specified. The test result shall be the average of the two specimens. If one specimen shows evidence of improper sampling, molding, or testing, the test result shall be the result of the remaining specimen; if both show such evidence, discard the test result and inform the architect.
 - e. Retain one specimen from each set for later testing, if required.
 - f. Strength potential of as-delivered concrete will be considered acceptable if all of the following criteria are met:
 - 1) No individual test result falls below specified compressive strength by more than 500 psi.
 - 2) Not more than 10 percent of individual test results fall below specified compressive strength $f'(c)$.

- 3) Average of any 3 consecutive strength test results equals or exceeds specified compressive strength $f'(c)$.
 3. Removal of forms or supports: Mold additional specimens and field-cure with concrete represented; test to determine strength of concrete at proposed time of form or support removal.
- H. Test Results: Testing agency shall report test results in writing to architect and contractor within 24 hours of test.
 1. Test reports shall contain the following data:
 - a. Project name, number, and other identification.
 - b. Name of concrete testing agency.
 - c. Date and time of sampling.
 - d. Concrete type and class.
 - e. Location of concrete batch in the completed work.
 - f. All information required by respective ASTM test methods.
 2. Nondestructive testing devices such as impact hammer or sonoscope may be used at architect's option for assistance in determining probable concrete strength at various locations or for selecting areas to be cored, but such tests shall not be the sole basis for acceptance or rejection.
 3. The testing agency shall make additional tests of in-place concrete as directed by the architect when test results indicate that specified strength and other concrete characteristics have not been attained.
 - a. Testing agency may conduct tests of cored cylinders complying with ASTM C 42, or tests as directed.
 - b. Cost of additional testing shall be borne by the contractor when unacceptable concrete has been verified.

END OF SECTION

SECTION 04 05 03

MASONRY MORTARING AND GROUTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Mortar for masonry.
 - 2. Grout for masonry.
- B. Related Sections:
 - 1. Section 04 20 00 - Unit Masonry: Installation of mortar and grout.
 - 2. Section 04 72 00 - Cast Stone Masonry: Installation of mortar.
 - 3. Section 08 11 13 - Hollow Metal Doors and Frames: Products and execution for grouting steel door frames installed in masonry.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2013.
- B. ASTM International:
 - 1. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
 - 2. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.
 - 3. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
 - 4. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
 - 5. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
 - 6. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
 - 7. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2015.
 - 8. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
 - 9. ASTM C476 - Standard Specification for Grout for Masonry; 2010.
 - 10. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2015a.
 - 11. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
 - 12. ASTM C1019 - Standard Test Method for Sampling and Testing Grout; 2013.
 - 13. ASTM C1072 - Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2013.
 - 14. ASTM D1148 - Standard Test Method for Rubber Deterioration-Discoloration from Ultraviolet (UV) or UV/Visible Radiation and Heat Exposure of Light-Colored Surfaces; 2013.
 - 15. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2014.
 - 16. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2014.
 - 17. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry; 2010.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also, include required environmental conditions and admixture limitations.
- C. Samples:
 - 1. Standard Masonry Mortar: Submit three samples illustrating color range.
 - 2. Colored Masonry Mortar: Submit two sample sets illustrating full range of mortar colors.
- D. Test Reports:
 - 1. Submit reports on mortar indicating conformance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.
 - 2. Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C1019.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.
- C. Maintain materials and surrounding air temperature to minimum 40 degrees F and maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.1 MORTAR AND GROUT APPLICATIONS

- A. Mortar: At Contractor's option, mortar may be field-mixed from packaged dry materials, made from factory premixed dry materials with addition of water only, or ready-mixed.
- B. Grout: Grout to be ready-mixed.
- C. Mortar Colors:
 - 1. Standard Masonry Mortar: Standard Gray.
 - a. Location: All masonry not indicated to be other color.
 - 2. Colored Masonry Mortar(s):

- a. Colors:
 - 1) Three colors as selected by Architect from submitted samples.
 - b. Locations:
 - 1) As indicated on Drawings.
- D. Mortar Mix Designs: ASTM C270, Property Specification.
- 1. Structural Masonry: Type S.
 - 2. Non-Structural Masonry: Type S.
 - 3. Repointing Masonry:
 - a. Match existing type, strength, composition and color at cured stage.
- E. Grout Mix Designs:
- 1. Structural Masonry: 3,000 psi strength at 28 days; 8-11 inches slump; provide ready-mixed type in accordance with ASTM C94/C 94M.
 - a. Fine grout.
 - 2. Non-Structural Masonry: 2,000 psi strength at 28 days; 8-11 inches slump; provide ready-mixed type in accordance with ASTM C94/C 94M.
 - a. Fine grout.

2.2 MATERIALS

- A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
- 1. Type: As indicated for Mortar Mix Design in MORTAR AND GROUT APPLICATIONS article in this Section.
 - 2. Color: As required to produce approved mortar color sample(s).
- B. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
- 1. Type: Fine.
- C. Portland Cement: ASTM C150/C150M.
- 1. Type: Type I - Normal; ASTM C150/C150M.
 - 2. Color: As required to produce approved mortar color sample(s).
- D. Hydrated Lime: ASTM C207, Type S.
- E. Mortar Aggregate: ASTM C144, standard masonry type.
- 1. Color: As required to produce approved mortar color sample(s).
- F. Grout Aggregate: ASTM C404.
- G. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
- 1. Color: As required to produce approved mortar color samples(s).
- H. Water: Clean and potable.
- I. Bonding Agent: Latex type.

2.3 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. Colored Mortar: Proportion selected pigments and other ingredients to match approved mortar color sample(s), without exceeding manufacturer's recommended pigment-to-cement ratio; mix in accordance with manufacturer's instructions, uniform in coloration.
- D. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- E. Do not use anti-freeze compounds to lower the freezing point of mortar.
- F. If water is lost by evaporation, re-temper only within two hours of mixing.

2.4 GROUT MIXING

- A. Ready-mixed type 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 admixtures in accordance with manufacturer's instructions; mix uniformly.
- D. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Request inspection of spaces to be grouted.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section. Prepare materials to be installed and equipment used during installation.
- B. Brace masonry to resist wet grout pressure.
- C. Remove excess mortar from grout spaces.
- D. Ensure that reinforcement is secured in required positions.
- E. Apply bonding agent to existing concrete surfaces where masonry units are set on concrete surfaces.

3.3 INSTALLATION

- A. Install mortar and grout to requirements of Section 04 20 00 - Unit Masonry and other section(s) in which masonry is specified.
- B. Work grout into masonry cores and cavities to eliminate voids.
- C. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.
- D. Do not displace reinforcement while placing grout.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing and inspection services.
- B. An independent testing agency will perform field tests.
- C. Test and evaluate mortar in accordance with ASTM C780 procedures for aggregate ratio and water content, air content, consistency, and compressive strength.

1. Test frequency: Every 5,000 sf of completed wall area.
- D. Test and evaluate grout in accordance with ASTM C1019 procedures for compressive strength, and in accordance with ASTM C143/C143M for slump.
1. Test frequency: Every 5,000 sf of completed wall area.

END OF SECTION

SECTION 04 20 00

UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete Masonry Units.
 - 2. Brick Masonry Units.
 - 3. Reinforcement and Anchorage.
 - 4. Accessories.

- B. Related Requirements:
 - 1. Section 01 21 00 - Allowances: Allowance(s) for brick.
 - 2. Section 04 05 03 - Masonry Mortaring and Grouting: Mortar and grout.
 - 3. Section 04 72 00 - Cast Stone Masonry.
 - 4. Section 05 12 00 - Structural Steel: Product requirements for steel anchors for placement by this section.
 - 5. Section 05 21 00 - Steel Joists: Product requirements for steel bearing pads for joists for placement by this section.
 - 6. Section 05 50 00 - Metal Fabrications: Product requirements for loose steel lintels and fabricated steel items for placement by this section.
 - 7. Section 05 40 00 - Cold Formed Metal Framing: Product requirements for steel bearing pads for trusses placed by this section.
 - 8. Section 07 11 00 - Dampproofing: Dampproofing masonry surfaces.
 - 9. Section 07 21 19 - Foamed-In-Place Insulation: For veneer wall cavity spaces.
 - 10. Section 07 62 00 - Sheet Metal Flashing and Trim: Product requirements for reglets for flashings for placement by this section.
 - 11. Section 07 84 00 - Firestopping: Firestopping at penetrations of masonry work.
 - 12. Section 07 90 00 - Joint Protection: Rod and sealant at control and expansion joints.
 - 13. Section 07 95 00 - Expansion Control.
 - 14. Division 08 - Openings: Multiple types of opening frames to be installed in or anchored to masonry work.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 216.1-14 - Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies.

- B. ASTM International:
 - 1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement, 2002.
 - 2. ASTM A153/A153M - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 3. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 4. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar, 2015.
 - 5. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2016.
 - 6. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable, 2016.

7. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete, 2017.
 8. ASTM C40/C40M - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete, 2019.
 9. ASTM C55 - Standard Specification for Concrete Brick, 2017.
 10. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale), 2017.
 11. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile, 2019.
 12. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.
 13. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units.
 14. ASTM C142/C142M - Standard Test Method for Clay Lumps and Friable Particles in Aggregates, 2017.
 15. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
 16. ASTM C641 - Standard Test Method for Iron Staining Materials in Lightweight Concrete Aggregates - 2017.
 17. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength; 2013.
 18. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar; 2014.
 19. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2018.
 20. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing, 2017.
 21. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact, 2014.
 22. ASTM D2287 - Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds, 2012.
 23. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
 24. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2018.
 25. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2014a.
 26. ASTM E514-74 - Standard Test Method for Water Penetration and Leakage through Masonry; 1974.
- C. Canadian Standards Association (CSA Group) (CSA):
1. CSA A82 - Fired Masonry Brick Made from Clay or Shale, 2014.
- D. National Fire Protection Association:
1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- E. The Masonry Society:
1. TMS 402/602 - Building Code Requirements and Specification For Masonry Structures.
- F. Underwriters Laboratories Inc.:
1. UL (FRD) - Fire Resistance Directory; current edition.
 2. UL 263 – Standard for Fire Tests of Building Materials.
 3. UL 618 – Standard for Concrete Masonry Units.
 4. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Product Data:
 - 1. Submit data for masonry units and fabricated wire reinforcement, wall ties, anchors and other accessories.
 - 2. Indicate initial rate of absorption for clay and shale brick.
- C. Samples for Initial Selections: Two manufacturer's complete sets of color samples illustrating the full range of finishes, textures and colors available; 4 x 4 x 1 inches in size. Include samples of full range of mortar and sealant colors for all unit masonry work. Submit for Architect's initial selections.
 - 1. Masonry Unit Types requiring sample submittals are as follows:
 - a. Face Brick.
- D. Samples for Verification: From the Architect's initial selections, prepare and submit three samples for each selected finish, texture and color; samples to be same product material type indicated for final Work; each masonry unit sample 12 x 12 x 1 inches; each mortar and sealant sample 3/8 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- E. Manufacturer's Certificate:
 - 1. Certify products meet or exceed specified requirements.
 - 2. Certify Aggregate used in Fire-Rated Concrete Masonry Units (CMU) is compliant with UL Fire Resistance Design Ratings requirements or alternate methods of determining fire resistance as allowed by Section 703.3 of the International Building Code.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with TMS 402/602 - Building Code Requirements for Masonry Structures.
 - 1. Maintain one copy of each document on project site
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum five (5) years of documented experience.
- C. Installer: Company specializing in performing Work of this section with minimum three (3) years documented experience.

1.5 MOCKUP

- A. Section 01 40 00 - Quality Requirements: Mockup requirements.
- B. Cavity Masonry Wall Mockup Panel: Construct panel including all types of masonry units indicated on Drawings, mortar and accessories, structural backup, cavity drainage materials, wall ties, window sill and frame, wall openings, flashings, wall insulation, and air barrier materials.
 - 1. Request Mockup detail drawing from Architect during submittal process.
 - a. Size: 8 feet long by 10 feet high.
 - 2. Mockup is to include all unit masonry materials and materials adjacent to unit masonry, including but not limited to:
 - a. Window frame and sill construction.
 - b. Roof water collector head.
 - c. Downspout and anchor straps.
 - d. Downspout boot.
 - 3. Locate panel where directed by Architect.

4. Remove panel after requesting and receiving approval for removal from Architect.

1.6 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Inspect products for damage during deliveries on site.
- C. Store products in accordance with manufacturer's recommendation and to avoid damage.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Cold Weather Requirements: In accordance with TMS 402/602 when ambient temperature or temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: In accordance with TMS 402/602 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate masonry work with related work to include, but not limited to:
 1. Installation of anchors for windows, doors fixtures and other work requiring anchors to masonry work. door anchors.
 2. Electrical items and other built-in work.
 3. Mechanical ducts and dampers.
 4. Plumbing work items. Copper piping to be isolated from contact with cementitious materials as per code requirements.
 5. Foamed-in-place insulation and all waterproofing and air barrier design elements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- C. Source Limitations for Masonry Accessories: Obtain each type of masonry accessory from single manufacturer for each product required.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Masonry: Comply with requirements for structural masonry indicated on the Drawings and as follows:

1. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
 2. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
- B. Unit Masonry Standard: Comply with provisions of TMS 602/ACI 530.1/ASCE 6, except where exceeded by requirements of the contract documents.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated on Drawings.
1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.
 2. Provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E119 or UL 263, and as acceptable to authorities having jurisdiction.
 - a. Alternate methods for determining fire resistance are to be as allowed by Section 703.3 of the International Building Code.

2.3 MASONRY UNITS - GENERAL

- A. Special Shapes: Applies to all required masonry unit types.
1. Provide special shape units for 90 degree and 135 degree corners and lintels.
 2. Provide solid units where Drawings indicate unit setting position or special shape would otherwise result in exposure of unit cores, frogs, voids or unfinished surfaces.
 3. Provide special shape units where Drawings indicate sculpted unit design (i.e. bullnose, angled, chamfered, ogee, coped water tables, sills, offsets, accents, etc.).
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

2.1 CONCRETE MASONRY UNITS

- A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units of same type:
1. Provide special shape units configured for corners, lintels, headers, control joint edges and for special conditions indicated on Drawings.
 2. Provide bullnose units as follows:
 - a. Wall outside corners.
 - 1) Exception: Provide angle-corner units for first exposed course at outside corners scheduled to receive wall base finish. Grind exposed upper portion of angle-corner unit to create a smooth transition to match the bullnose units above.
 - 2) Wall caps, unless other cap material finish is indicated.
 - 3) Window sills, unless other sill material finish is indicated.
 - 4) Protect installed window sills from mortar spatter/droppings and other damage.
- B. Fire-Rated Hollow Load Bearing and Non-Load Bearing Concrete Masonry Units (CMU):
1. ASTM C90; light weight; UL 618; ACI 216.1-14.
 2. Single scored vertically where indicated on Drawings.
- C. Hollow Load Bearing Concrete Masonry Units (CMU):
1. ASTM C90; lightweight in accordance with ASTM C331 with the following modifications:
 - a. Organic Impurities (Color): ASTM C40/C40M <1

- b. Clay Lumps (%): ASTM C142/C142M <2
 - c. Stain Test (Index): ASTM C641 No Stain
 - 2. Single scored vertically where indicated on Drawings.
- D. Solid Load-Bearing Concrete Masonry Units (CMU):
 - 1. ASTM C90; lightweight in accordance with ASTM C331 with the following modifications:
 - a. Organic Impurities (Color): ASTM C40/C40M <1
 - b. Clay Lumps (%): ASTM C142/C142M <2
 - c. Stain Test (Index): ASTM C641 No Stain
 - 2. Single scored vertically where indicated on Drawings.
- E. Hollow Non-Load Bearing Concrete Masonry Units (CMU):
 - 1. ASTM C129; lightweight.
 - 2. Single scored vertically where indicated on Drawings.
- F. Concrete Masonry Unit Size and Shape: Modular face size of 7-5/8 x 15-5/8 inches and depths as indicated on Drawings.
 - 1. Bond: 1/2 Bond (Running Bond), unless indicate otherwise on Drawings.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints Tooling: Refer to INSTALLATION in this Section.
- G. Concrete Brick Units: ASTM C55; for use in concealed utilitarian applications.
- H. Cast Stone Masonry: Refer to Section 04 72 00 - Cast Stone Masonry.

2.2 BRICK MASONRY UNITS

- A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units of same type:
 - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - 2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - 3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - 4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
 - 5. For Soldier Course applications, provide shapes that produce coursing pattern and unit size as indicated on Drawings.
- B. Face Brick Modular Size: ASTM C216, Type FBS, Grade SW.
 - 1. Size: 2-1/4 x 3-5/8 x 7-5/8 inches.
 - 2. Unit Compressive Strength: 3,000 psi minimum, unless indicated otherwise on Drawings.
 - a. Measured in accordance with ASTM C67/C67M.
 - b. As determined by average of five (5) brick method; and no individual brick less than 2,500 psi.
 - 3. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested according to ASTM C67/C67M.
 - 4. Efflorescence Rating: Rating to be "not effloresced" in accordance with ASTM C67/C67M or rating to be "slightly effloresced" in accordance with CSA A82.
 - 5. Bond: 1/2 Bond (Running Bond); unless indicated otherwise on Drawings.
 - 6. Coursing: Three units and three mortar joints to equal 8 inches.
 - 7. Mortar Joint Tooling: Refer to INSTALLATION in this Section.

8. Basis of Design Products: Subject to compliance with requirements, provide face brick with physical and visual characteristics comparable to the following basis of design units, as approved by Architect:
 - a. Face Brick Color - BRK1:
 - 1) Palmetto Brick: Medium Red Wirecut
 - b. Face Brick Color - BRK2:
 - 1) Palmetto Brick: .25 Greystone Wirecut.
- C. Building (Common) Brick:
 1. ASTM C62, Grade SW; solid units.
 2. Unit Compressive Strength: 3,000 psi minimum, unless indicated otherwise on Drawings.
 - a. Measured in accordance with ASTM C67/C67M.
 - b. As determined by average of five (5) brick method; and no individual brick less than 2,500 psi.
 3. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested according to ASTM C 67.
 4. Efflorescence Rating: Rating to be “not effloresced” in accordance with ASTM C67/C67M or rating to be “slightly effloresced” in accordance with CSA A82.

2.3 ACCESSORIES

- A. Manufacturers: Reinforcement and anchorage materials.
 1. Hohmann & Barnard, Inc.
 2. Wire-Bond.
 3. Blok-Lok Limited.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) yield strength, deformed billet bars, uncoated finish.
- C. Reinforcing Steel Rebar Positioners (Z-shaped wire bridges cell of block while bent ends rest on block shell):
 1. Hohmann & Barnard, Inc - HB RB Rebar Positioner. (Basis of Design)
 2. Wire (Carbon Steel): Cold-drawn steel wire conforming to ASTM A82/A82M
 3. Wire Diameter: 9 gauge (.148 inch)
 4. Tensile Strength: 80,000 psi.
 5. Yield Point - 70,000 psi minimum.
 6. Hot-Dip Galvanized after fabrication: ASTM A153/A153M (1.5 oz/ft).
- D. Single Wythe Joint Reinforcement: Ladder type; ASTM A951/A951M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1875 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
 1. Hohmann & Barnard, Inc - HB 220 Ladder-Mesh. (Basis of Design)
- E. Multiple Wythe Joint Reinforcement: Ladder type; ASTM A951/A951M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1875 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
 1. Hohmann & Barnard, Inc - HB 220 Ladder-Mesh. (Basis of Design)
- F. Strap Anchors: Zee bent steel shape. 1-1/2 x 16 inches size x 1/4 inch thick. Hot dip galvanized after fabrication to ASTM A153/A153, Class B.
 1. Hohmann & Barnard, Inc - HB 344 Rigid Partition Anchor. (Basis of Design)
- G. Cavity Wall Joint Reinforcing / Wall Ties: Ladder type, 0.1875 inch side rods with 0.148 inch cross rods; eye and pintle type anchors, 0.188 inch wire with compressed pintle legs;

- seismic clip to continuous rod in veneer, 0.1875 inch rod. All, ASTM A951/A951M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B.
1. Hohmann & Barnard, Inc. - HB 265 S.I.S Ladder -2X Hook Anchor and Seismic Interlock System. (Basis of Design)
 2. Where coursing of masonry veneer and structural masonry is not dimensionally aligned, provide joint reinforcing and wall tie system that allows for variations in alignment, up to 2-1/4 inch.
 3. Soldier Course Masonry Veneer: Due to the vertical joint condition, anchor system must turn vertical to accommodate joint.
 - a. Base Plate: ASTM A1008/A1008M carbon steel plate, 16 gauge thick x 2 inches wide with 1 inch bend. Hot dip galvanized to ASTM A153/A153M, Class B.
 - b. Wire Tie: ASTM A1064/A1064M carbon steel, 0.1875 inch wire. Hot dip galvanized to ASTM A153/A153M, Class B.
 - c. Hohmann & Barnard, Inc. - HB BL-5407. (Basis of Design)
- H. Wall Ties: ASTM A82; steel wire 0.1875 inch diameter, eye and pintle type. ASTM A153/A153M, Class B hot dip galvanized after fabrication.
- I. Wall Ties (For Attachment to Metal Studs): Two-piece type; ASTM A1008/A1008M, 14 gage steel anchors; 0.1875 inch diameter wire ties. ASTM A153/A153M, Class B hot dip galvanized after fabrication.
- J. Wall Ties (For Attachment to Structural Steel): Two-piece type; 0.25 inch continuous steel weld-on anchors, 8 feet total length, with 3/8 inch offsets spaced 8 inches o.c.; 0.1875 inch diameter wire ties. ASTM A153/A153M, Class B hot dip galvanized after fabrication.
- K. Wall Ties (For Attachment to Concrete Walls): Two piece type; ASTM A1008/A1008M, 18 gauge steel imbedded dovetail anchors, 10 feet total length, with foam insert; 0.1875 inch diameter wire ties. ASTM A153/A153M, Class B hot dip galvanized after fabrication.
- L. Mortar and Grout: As specified in Section 04 05 03 - Masonry Mortaring and Grouting.
- M. Through-Wall and Counter Flashing: Self adhering stainless steel fabric flashing; width of roll to suit application; with preformed end dams, and inside and outside corners.
 1. Thickness:
 - a. Membrane - 0.040 inch (40 mil).
 - b. Stainless steel - 0.030 inch (30 mil); Type 304.
 2. Tensile Strength - ASTM D412C: 100.000 psi, minimum.
 3. Puncture Resistance - ASTM E154: 2,500 psi, minimum.
 4. Peel Strength of Adhesive Bonds - ASTM D903: Not less than 103 lbs/ft.
 5. Fire Resistance - ASTM E84: Pass.
 6. Mold Resistance - ASTM D3273: Pass.
 7. Hohmann & Barnard, Inc. - Mighty-Flash, SA Flashing (Basis of Design).
- N. Termination Bar at Top of Through-Wall Flashing: Type 304, stainless steel type, 1 inch x 8 feet x 1/8 inch thick.
 1. At all locations where top edge of through-wall flashing is not indicated to be imbedded into back-up masonry wall, install continuous Termination Bar along top edge using stainless steel fasteners at 8 inches o.c., preventing pull-out. Apply sealant continuously along top edge of termination bar and flashing assembly to seal against water penetration behind top of through-wall flashing assembly.
 2. Hohmann & Barnard, Inc. (Basis of Design)
- O. Metal Flashing Drip Edge Plate: Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gauge (0.0179 inch) thick, factory formed hemmed drip edge configuration; finish 2D (dull).

1. Hohmann & Barnard, Inc. - HB Drip Edge Plate. (Basis of Design)
 2. Length: Not less than 8 feet long.
 3. Width: As indicated on Drawings, but not less than 3 inches wide.
 4. Provide factory preformed Inside Corners, Outside Corners and End Dams.
- P. Preformed Control and Expansion Joints: Extruded polyvinyl chloride material conforming with ASTM D2287. Furnish with corner and tee accessories. Fuse joints.
1. Tensile Strength - ASTM D412: 2200 psi.
 2. Ultimate Elongation - ASTM D412: 350 percent.
 3. Shore A Hardness - ASTM D2240: 85 (+ or - 5).
 4. Low Temp Brittleness - ASTM D746: -35 degrees C.
- Q. Joint Filler: Closed cell rubber (polychloroprene) oversized 50 percent to joint width; self-expanding; width indicated by maximum lengths.
- R. Cavity Drainage Material:
1. Open polyethylene or polypropylene mesh; thickness as required to fill cavity space; 10 inches high with 7 inch deep dovetail notches at top; designed to allow cavity drainage and prevent collection and damming effect of mortar droppings in cavity.
- S. Weeps: Preformed corrugated polypropylene cell vents. Conforming to Standards: ASTM D2240, ASTM D790B, ASTM D638 and ASTM D1238B.
1. Hohmann & Barnard, Inc. - HB Quadro Vent. (Basis of Design)
 2. Size: 2-1/2 x 3-1/2 inch size, 3/8 inch thick.
 3. Color: Clear.
- T. Cavity Vents: Same material as weeps.
- U. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
1. Sure-Klean Vanatrol. (Basis of Design)
- V. Steel Lintels, Window Sill Supports and Other Steel Supports: Refer to Section 05 50 00 - Metal Fabrications. Size and configuration as indicated on Drawings. All exterior steel components to be hot dip galvanized per Section 05 50 00.
- W. Parging Material: Light weight mortar finish coat.
1. One component; polymer modified mortar; compressive strength of 2,000 psi, minimum at 28 days; tension adhesive strength of 250 psi, minimum at 28 days.
 2. Sika Corporation - SikaQuick Smooth Finish. (Basis of Design)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify field conditions are acceptable and are ready to receive work.
- C. Verify items provided by other sections of work are properly sized and located.
- D. Verify built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment used during installation.
- C. Direct and coordinate placement of metal anchors supplied to other sections.

- D. Provide protection coverings to protect adjacent and surrounding work from damage and mortar and grouting splatters/droppings.
- E. Furnish temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.
- F. Wet clay and shale brick before laying when initial rate of absorption is greater than 30 grams when tested in accordance with ASTM C67/C67M.

3.3 INSTALLATION

- A. Protection Against Water Infiltration: Protect tops of masonry work with waterproof coverings secured in place without damaging masonry. Provide coverings where masonry is exposed to weather when work is not in progress.
- B. Establish lines, levels, and coursing indicated. Protect from displacement.
- C. Maintain masonry courses to uniform dimension. Form bed and head joints of uniform thickness.
- D. Placing and Bonding:
 - 1. Lay solid masonry units in full bed of mortar, with full head joints.
 - 2. Lay hollow masonry units with face shell bedding on head and bed joints.
 - 3. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
 - 4. Remove excess mortar as work progresses.
 - 5. Interlock intersections and external corners.
 - 6. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.
 - 7. Perform job site cutting of masonry units with proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
 - 8. Isolate masonry from vertical structural framing members with movement joint.
 - 9. Isolate top of masonry from horizontal structural framing members and slabs or decks with compressible joint filler.
- E. Mortar Joints Tooling: Concave.
 - 1. Exceptions as follows:
 - a. For food preparation, handling and storage areas such as Kitchens, Food Service Areas, Food Storage Areas, Dishwashing Areas, Kitchen Offices and Kitchen Area Toilets/Locker Rooms.
 - 1) Cut mortar joints flush with face of masonry unit as preparation for application of PARGING - SKIM COAT (or THICK COAT) finish when indicated in this Section or on Drawings.
- F. Weeps: Furnish weeps in outer wythe at 24 inches o.c. horizontally above through-wall flashing, above shelf angles and lintels and at bottom of walls.
- G. Cavity Wall: Do not permit mortar to drop or accumulate into cavity air space or to plug weeps.
 - 1. Install cavity drain material continuously at bottom of each cavity above through-wall flashing.
 - 2. At foundation and below grade locations, m, don't allow debris or soil to collect and remain in the cavity prior to installing the cavity materials as indicated on Drawings. Ensure that the cavity is free of any debris or soil prior to installing cavity materials as indicated on Drawings.
- H. Joint Reinforcement and Anchorage - Single Wythe Masonry:
 - 1. Install horizontal joint reinforcement 16 inches oc.

2. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
 3. Place joint reinforcement continuous in first joint below top of walls.
 4. Lap joint reinforcement ends minimum 6 inches.
 5. Reinforce joint corners and intersections with strap anchors 16 inches oc.
- I. Joint Reinforcement and Anchorages - Multiple Wythe Unit Masonry:
1. Install horizontal joint reinforcement 16 inches o.c.
 2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
 3. Place joint reinforcement continuous in first and second joint below top of walls.
 4. Lap joint reinforcement ends minimum 6 inches.
 5. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- J. Joint Reinforcement and Anchorage - Masonry Veneer (where no cavity indicated on Drawings) (Interior walls only; exterior walls must have cavity for drainage.):
1. Install horizontal joint reinforcement 16 inches oc.
 2. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
 3. Place joint reinforcement continuous in first joint below top of walls.
 4. Lap joint reinforcement ends minimum 6 inches.
 5. Embed wall ties in masonry backing to bond veneer at maximum 16 inches oc vertically and 16 inches oc horizontally. Place wall ties at maximum 8 inches oc vertically within 8 inches of jamb of wall openings.
 6. Reinforce joint corners and intersections with strap anchors 16 inches oc.
- K. Joint Reinforcement and Anchorages - Cavity Wall Masonry:
1. Install horizontal joint reinforcement 16 inches oc.
 2. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
 3. Place joint reinforcement continuous in first joint below top of walls.
 4. Lap joint reinforcement ends minimum 6 inches.
 5. Attach to structural steel members. Embed anchorages in every second block joint.
 6. Reinforce joint corners and intersections with strap anchors 16 inches oc.
- L. Masonry Through-Wall Flashings:
1. Solid substrate to be continuous below and behind flashing material.
 2. Install metal flashing drip edge plate with sealed lap joints and preformed corners and end dams in accordance with manufactures recommendations. Adhere through-wall flashing continuously along top of drip edge plate as indicated on Drawings and with adhesive compatible with both surface types.
 3. Whether or not specifically indicated, install masonry through-wall flashing to divert water to exterior at all locations where downward flow of water would otherwise be interrupted.
 4. Extend through-wall flashings horizontally through outer wythe at foundation walls, above ledge or shelf angles and lintels, under parapet caps and at bottom of walls, and terminate bottom and top edges as indicated on Drawings.
 - a. Unless indicated otherwise on Drawings, extend vertical flashing portion a minimum of 8 inches above lower flashing portion that diverts water to exterior.
 - 1) Self-Adhering Flashing (when indicated):
 - a) Terminate top edge with continuous termination bar and sealant.

- b) Terminate bottom edge at no more than 1/4 inch from exterior face of masonry. For steel support lintels and ledges, terminate bottom edge of flashing at steel support edge.
 - 2) Non-Self-Adhering Flashing (when indicated):
 - a) Terminate top edge by embedding top edge into masonry joint with a minimum of 1-1/2 inches embedment and seal.
 - (1) Exception: Only if indicated on Drawings in specific construction locations, top edge to be terminated with termination bar and sealant.
 - b) Terminate bottom edge at no more than 1/4 inch from exterior face of masonry. For steel support lintels and ledges, terminate bottom edge at steel support edge.
 - 5. Lap end joints minimum 6 inches and seal watertight with sealant recommended by flashing manufacturer.
 - 6. Form and configure flashing as to drain moisture along its drainage path to the exterior of the wall, preventing moisture migration into the wall and cavity.
 - 7. Turn flashing, fold, and seal at corners, bends, and interruptions. Use preformed end dams, and inside and outside corners when indicated.
- M. Lintels:
- 1. Install loose steel and reinforced unit masonry lintels over openings as indicated.
 - 2. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled or indicated.
 - 3. Do not splice reinforcing bars.
 - 4. Support and secure reinforcing bars from displacement.
 - 5. Place and consolidate grout fill without displacing reinforcing.
 - 6. Allow masonry lintels to attain specified strength before removing temporary supports.
 - 7. Maintain minimum 8 inches bearing on each side of opening.
- N. Grouted Components:
- 1. Reinforce bond beam as indicted on Drawings.
 - 2. Lap splices for reinforcing bars to be as required by code and Drawings and as related to the bar diameters.
 - 3. Support and secure reinforcing bars from displacement.
 - 4. Place and consolidate grout fill without displacing reinforcing.
 - 5. At bearing locations, fill masonry cores with grout for minimum 12 inches both sides of opening.
- O. Reinforced Masonry:
- 1. Lay masonry units with core vertically aligned and clear of mortar and unobstructed.
 - 2. Place reinforcement bars as indicated on Drawings.
 - 3. Splice reinforcement in accordance with Section 03 20 00.
 - 4. Support and secure reinforcement from displacement.
 - 5. Place and consolidate grout fill without displacing reinforcing.
 - 6. Place grout in accordance with TMS 402/602 Specification for Masonry Structures.
- P. Control and Expansion Joints:
- 1. Install control and expansion joints at locations indicated on Drawings and not to exceed the following maximum spacing:
 - a. Exterior Walls: 24 feet on center and within 24 inches on one side of each interior and exterior corner.
 - b. Interior Walls: 24 feet on center.
 - c. At changes in wall height.
 - 2. Do not continue horizontal joint reinforcement through expansion joints.

3. Install preformed control and expansion joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
4. Size control joint in accordance with Section 07 90 00 for sealant performance.
5. Form expansion joint by omitting mortar and cutting unit to form open space.

Q. Built-In Work:

1. As work progresses, install built-in metal door and glazed frames, window frames, anchor bolts, plates, and other items to be built-in the work and furnished by other sections.
2. Install built-in items plumb and level.
3. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout or mortar. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
4. Do not build into masonry construction organic materials or other materials that are subject to deterioration.

3.4 CUTTING AND FITTING

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

3.5 PARGING - WALL SURFACE COAT

- A. Locations:
 1. Kitchen, Serving Areas, Dishwashing Area and connecting Rooms and Areas with doors and openings to Kitchen, Serving Areas and Dishwashing Areas.
 2. Does not include Dining Area.
- B. Prepare material and apply in accordance with manufacturer's instructions and as follows:
 1. Dampen masonry walls prior to parging. Substrate should be Saturated Surface Dry (SSD).
 2. Dry Thickness: Minimum indicated; additional thickness as required to produce a uniformly flat and smooth wall surface.
 - a. 1/8 inch thick.
 3. Steel trowel surface smooth and flat with a maximum surface variation of 1/16 inch in 4 feet. Sand surface as needed. Finish as required for paint or other scheduled finish.

3.6 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Alignment of Columns and Pilasters: 1/4 inch.
- C. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.
- D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- G. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
- H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.
- I. Maximum Variation for Steel Reinforcement:

1. Install reinforcement within the tolerances specified in TMS 402/602 for foundation walls.
2. Plus or minus 1/2 inch when distance from centerline of steel to opposite face of masonry is 8 inches or less.
3. Plus or minus 1 inch when distance is between 8 and 24 inches.
4. Plus or minus 1-1/4 inch when distance is greater than 24 inches.
5. Plus or minus 2 inches from location along face of wall.

3.7 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Remove excess mortar and mortar smears as work progresses.
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with cleaning solution.
- E. Use non-metallic tools in cleaning operations.
- F. Progress Payments for completed work will not be made until brick is cleaned of all excessive mortar and mortar stains.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.
- C. Protect base of interior and exterior walls from mud and mortar splatter.
- D. Protect masonry and other items built into masonry walls from mortar droppings and staining caused by mortar and grouting activities.
- E. Protection Against Water Infiltration: Protect tops of masonry work with waterproof coverings secured in place without damaging masonry. Provide coverings where masonry is exposed to weather when work is not in progress.

END OF SECTION

SECTION 04 72 00
CAST STONE MASONRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sills for windows.
 - 2. Caps for masonry walls.
 - 3. Caps for masonry columns.
 - 4. Caps for monumental sign wall.
 - 5. Other cast stone items indicated on Drawings.

- B. Related Requirements:
 - 1. Section 04 05 03 - Masonry Mortaring and Grouting: Mortar for setting cast stone.
 - 2. Section 04 20 00 - Unit Masonry: Installation of cast stone in conjunction with masonry.
 - 3.
 - 4. Section 05 50 00 - Metal Fabrications: Loose lintels and supports for cast stone units.
 - 5. Section 07 90 00 - Joint Protection: Sealing joints indicated to be left open for sealant.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
 - 2. ACI 530 - Building Code Requirements for Masonry Structures.
 - 3. ACI 530.1 - Specifications for Masonry Structures.

- B. ASTM International (ASTM):
 - 1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
 - 2. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
 - 3. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009.
 - 4. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2007b (Reapproved 2014).
 - 5. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2014.
 - 6. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
 - 7. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
 - 8. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 9. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
 - 10. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
 - 11. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.
 - 12. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete; 2013.

13. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
14. ASTM C1195 - Standard Test Method for Absorption of Architectural Cast Stone.
15. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2016.

1.3 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate cast stone work with masonry backup and veneer, framed backup and installation of anchors for frames in openings.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures: Requirements, for submittal procedures.
- B. Product Data: Test results of cast stone components made previously by the manufacturer.
- C. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
- D. Samples for Initial Selections: Two manufacturer's complete sets of color samples illustrating the full range of finishes, textures and colors available; 4 x 4 x 1 inches in size. Include samples of full range of mortar and sealant colors. Submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish, texture and color; samples to be same product material type indicated for final Work; each cast stone sample 12 x 12 x 1 inches; each mortar and sealant sample 3/8 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Test Reports: Indicate concrete mix design compressive strength and water absorption.
- G. Manufacturer's Installation Instructions: Submit instructions for anchor attachment, cast stone cleaning, and special Project installation conditions.
- H. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 Building Code Requirements for Masonry Structures and ACI 530.1 Specification for Masonry Structures.
- B. Perform Work in accordance with Cast Stone Institute Technical Manual.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years documented experience.
 1. Current producer member of the Cast Stone Institute or the Architectural Precast Association.
 2. Manufacturer's production facility currently holds a Plant Certification from the Cast Stone Institute or the Architectural Precast Association.
 3. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.
- B. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience.

1.7 MOCKUP

- A. Section 01 40 00 - Quality Requirements: Mockup requirements.
- B. Provide full size cast stone components for installation in mock-up of exterior wall.
 - 1. Approved mockup will become standard for appearance and workmanship.
 - 2. Remove mock-up not incorporated into the work and dispose of debris.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
- C. Number each piece individually to match shop drawings and schedule.
- D. Store cast stone components and installation materials in accordance with manufacturer's instructions.
- E. Store cast stone components on pallets with non-staining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- F. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
- G. Store mortar materials where contamination can be avoided.
- H. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Architectural Cast Stone:
 - 1. Any current producer member of the Architectural Precast Association or the Cast Stone Institute.

2.2 ARCHITECTURAL CAST STONE

- A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural granite, complying with ASTM C1364.
 - 1. Compressive Strength: ASTM C39/C39M; minimum 5,000 psi at 28 days.
 - 2. Absorption: ASTM C1195; maximum 6 percent for cold water and 10 percent for boiling water at 28 days.
 - 3. Freeze-Thaw Resistance: Demonstrated by field experience.

4. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 10 feet.
 5. Color: Selected by Architect from manufacturer's full range.
 6. Remove cement film from exposed surfaces before packaging for shipment.
- B. Shapes: Provide shapes indicated on drawings.
1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
 2. Unless otherwise indicated on drawings, provide:
 - a. Wash or slope of 1:12 on exterior horizontal surfaces.
 - b. Drips on projecting components, wherever possible and as indicated on Drawings.
- C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.
1. Pieces more than 24 inches in any dimension: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.
- D. Materials:
1. Portland Cement: ASTM C150/C150M.
 - a. For Precast Units:
 - 1) Type I - Normal, white or gray as required to match Architect 's selected sample.
 - 2) Type III - High Early Strength, for use in cold weather, white or gray as required to match Architect 's selected sample.
 - b. For Units: Type I or II, white.
 2. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
 3. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
 4. Pigments: ASTM C979, inorganic iron oxides; do not use carbon black.
 5. Admixtures: ASTM C494/C494M.
 6. Water: Potable.
 7. Reinforcing Bars: ASTM A615/A615M deformed bars, galvanized.
 - a. Galvanized in accordance with ASTM A767/A767M, Class I.
 - b. Epoxy coated in accordance with ASTM A775/A775M.
 8. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.
 9. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
 10. Flashings: As specified in Section 04 20 00 and as indicated on Drawings.
 11. Shelf Angles and Similar Structural Items: Hot-dip galvanized steel per ASTM A123/A123M, of shapes and sizes as required for conditions.
 12. Mortar: Portland cement-lime, as specified in Section 04 05 11; do not use masonry cement.
 13. Mortar: As specified in Section 04 20 00.
 14. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.3 FABRICATION

- A. Size: As indicated on Drawings, square edges unless indicated otherwise on Drawings.
- B. Use rigid molds, constructed to maintain cast stone units uniform in shape, size, and finish.
- C. Form units to length required for joint layout indicated on Drawings. Field cutting to length is not permitted.
- D. Reinforce units in accordance with ASTM C1364 for safe handling and as indicated on shop drawings to resist structural loads.
- E. Form corners to profiles indicated on Drawings.
- F. Form drip slot in bottom surface of exterior units projecting 3/4 inch or more beyond face of wall. Locate slot 3/8 inch back from nose of projection. Size slot not less than 3/8 inch wide and 3/8 inch deep and continuous for full width of projection.
- G. Curing: Cure units to develop concrete quality, and to minimize appearance blemishes including non-uniformity, staining, or surface cracking.
- H. Acid etch exposed-to-view surfaces to remove cement film and achieve uniform appearance.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Examine construction to receive cast stone components.
- C. Do not begin installation until unacceptable conditions have been corrected.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Provide for erection procedures and induced loads during erection. Furnish temporary bracing during installation. Maintain temporary bracing in place until final support is provided.
- B. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 20 00.
- C. Mechanically anchor cast stone units indicated; set remainder in mortar.
- D. Erect units without damage to shape or finish. Replace or repair damaged panels.
- E. Erect units level and plumb within allowable tolerances.
- F. Align and maintain uniform horizontal and vertical joints as erection progresses.
- G. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect.
- H. Setting:
 - 1. Drench cast stone components with clear, running water immediately before installation.
 - 2. Set units in a full bed of mortar unless otherwise indicated. Allow for final joint finish material application.

3. Fill vertical joints with mortar, but allowing for final joint finish material application.
 4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
 5. Do not shift or tap cast stone units after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.
- I. Joints: Where Drawings indicate specific locations for joints, comply with locations indicated.
1. Exposed joint widths to be 3/8 inch unless otherwise indicated on Drawings.
 2. Rake and clear mortar joints to 3/4 inch depth from unit face for application of joint finish material.
 3. Remove excess mortar from face of stone before application of joint finish material.
 4. Seal perimeter and intermediate joints in accordance with Section 07 90 00 with non-staining, silicone type sealant.
 5. Tool joint finish material to finish profile as indicated on Drawings.
- J. Installation Tolerances:
1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
 2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
 3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
 4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.
- K. Repairs: Repair chips and other surface damage noticeable when viewed in direct daylight at 10 feet.
1. Remove and replace units that cannot be repaired to the approval of Architect.
 2. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
 3. Repair methods and results subject to Architect 's approval.

3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean Work in accordance with manufacturer's instructions.
- C. Keep cast stone components clean as work progresses.
- D. Clean completed exposed cast stone after mortar is thoroughly set and cured.
- E. Wet surfaces with water before applying cleaner.
- F. Apply cleaner to cast stone in accordance with manufacturer's instructions.
- G. Remove cleaner promptly by rinsing thoroughly with clear water.
- H. Do not use acidic cleaners.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect completed work from damage.
- C. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Structural shapes.
 - 2. Channels and angles.
 - 3. Hollow structural sections.
 - 4. Structural pipe.
 - 5. Structural plates and bars.
 - 6. Fasteners, connectors, and anchors.
 - 7. Base plate grout.
- B. Related Sections:
 - 1. Section 052100 - Steel Joists.
 - 2. Section 053100 - Steel Decking.

1.2 REFERENCES

- A. American Institute of Steel Construction:
 - 1. AISC Code of Standard Practice for Steel Buildings and Bridges.
 - 2. AISC Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings.
 - 3. AISC Load and Resistance Factor Design Specification for Single-Angle Members.
 - 4. AISC Seismic Provisions for Structural Steel Buildings.
 - 5. AISC Specification for Allowable Stress Design of Single-Angle Members.
 - 6. AISC Specification for the Design of Steel Hollow Structural Sections.
 - 7. AISC Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.
- B. American Society of Civil Engineers:
 - 1. ASCE 19 - Standard Applications of Steel Cables for Buildings.
- C. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
 - 4. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 5. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 6. ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
 - 7. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - 8. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - 9. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.

10. ASTM A449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs.
 11. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
 12. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 13. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 14. ASTM A514/A514M - Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.
 15. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
 16. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 17. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 18. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4-in. (100-mm) Thick.
 19. ASTM A618 - Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.
 20. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
 21. ASTM A847 - Standard Specification for Cold-Formed Welded and Seamless High Strength, Low Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance.
 22. ASTM A852/A852M - Standard Specification for Quenched and Tempered Low-Alloy Structural Steel Plate with 70 ksi (485 MPa) Minimum Yield Strength to 4 in. (100 mm) Thick.
 23. ASTM A913/A913M - Standard Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST).
 24. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
 25. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 26. ASTM E94 - Standard Guide for Radiographic Examination.
 27. ASTM E164 - Standard Practice for Ultrasonic Contact Examination of Weldments.
 28. ASTM E165 - Standard Test Method for Liquid Penetrant Examination.
 29. ASTM E709 - Standard Guide for Magnetic Particle Examination.
 30. ASTM F436 - Standard Specification for Hardened Steel Washers.
 31. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
 32. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
 33. ASTM F1852 - Standard Specification for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- D. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
 2. AWS D1.1 - Structural Welding Code - Steel.
- E. National Association of Architectural Metal Manufacturers:
1. NAAMM MBG 531, "Metal Bar Grating Manual"

- F. Research Council on Structural Connections:
 - 1. RCSC - Specification for Structural Joints Using ASTM A325 or A490 Bolts.
- G. SSPC: The Society for Protective Coatings:
 - 1. SSPC - Steel Structures Painting Manual.
 - 2. SSPC Paint 15 - Steel Joist Shop Paint.
 - 3. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
 - 4. SSPC SP 3 - Power Tool Cleaning.
 - 5. SSPC SP 6 - Commercial Blast Cleaning.

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, location of structural members, openings, attachments and fasteners.
 - 2. Connections. Engage a fabricator who utilizes a South Carolina registered Professional Engineer to prepare calculations, shop drawings and other structural data for structural steel connections.
 - 3. Cambers.
 - 4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Mill Test Reports: Submit indicating structural strength, destructive and non-destructive test analysis.
- D. Manufacturer's Mill Certificate: Certify products meet or exceed specified requirements.
- E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
 - 1. AISC Code of Standard Practice for Steel Buildings and Bridges.
 - 2. AISC Code of Standard Practice for Steel Buildings and Bridges. Section 10.
 - 3. AISC Seismic Provisions for Structural Steel Buildings.
 - 4. AISC Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.

1.5 QUALIFICATIONS

- A. Fabricator: Company specializing in performing Work of this section with minimum 5 years' experience with the following current AISC Certification:
 - 1. Standard Steel Building Structures (STD).
- B. Erector: Company specializing in performing Work of this section with minimum 5 years' experience.
- C. Welders and Welding Procedures: AWS D1.1 qualified within previous 12 months.

1.6 COORDINATION

- A. Section 01400 - Quality Requirements.
- B. Coordinate work with the following:
 - 1. Section 05210, 05310.
 - 2. Section 05500 for miscellaneous steel supports other than structural steel.
 - 3. Section 07811 for finishes on structural steel receiving fireproofing.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

- A. Structural W-Shapes: ASTM A992.
- B. Structural M-Shapes: ASTM A36.
- C. Structural T-Shapes: Cut from structural W-shapes.
- D. Channels and Angles: ASTM A36.
- E. Square and Rectangular Hollow Structural Sections: ASTM A500, Grade B.
- F. Structural Pipe: ASTM A53, Grade B.
- G. Structural Plates and Bars: ASTM A36.
- H. Wire Rod for Grating Crossbars: ASTM A 510

2.2 FASTENERS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish, Interior Framing: Plain, uncoated.
 - 2. Finish, Exterior Framing: Mechanically deposited zinc coating, ASTM B 695, Class 50.
- B. Nuts: ASTM A563 heavy hex type.
 - 1. Finish: Unfinished.
- C. Washers: ASTM F436; Type 1, circular
 - 1. Finish: Unfinished.
- D. Shear Connectors: ASTM A108; Grade 1015 or 1020, headed, unfinished and in accordance with AWS D1.1; Type B.
- E. Threaded Anchor Rods: ASTM F 1554, Grade 36 or Grade 55, as indicated on Drawings.
 - 1. Configuration: Straight.
 - 2. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
 - 5. Finish, Interior Framing: Plain.
 - 6. Finish, Exterior Framing: Hot-dip zinc coating, ASTM A 153/A 153M, Class C or mechanically deposited zinc coating, ASTM B 695, Class 50.

2.3 WELDING MATERIALS

- A. Welding Materials: AWS D1.1; type required for materials being welded.

2.4 ACCESSORIES

- A. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing minimum compressive strength of 7,000 psi at 28 days.
- B. Shop and Touch-Up Primer:
 - 1. Concealed Structural Steel: Fabricators dark color rust-inhibiting primer.
 - 2. Exposed Structural Steel: Refer to Division 9.

2.5 FABRICATION

- A. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- B. Fabricate connections for bolt, nut, and washer connectors.
- C. Develop required camber for members.

2.6 FINISH

- A. Prepare structural component surfaces in accordance with SSPC SP 3 "Power Tool Cleaning" for all concealed work and SSPC SP 6 "Commercial Blast Cleaning" for all work exposed to view.
- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded or in contact with concrete.
- C. Galvanizing for Structural Steel Members: ASTM A123; minimum 1.2 oz/sq ft coating thickness; galvanize after fabrication.
- D. Galvanizing for Fasteners, Connectors, and Anchors:
 - 1. Hot-Dipped Galvanizing: ASTM A153.

2.7 SOURCE QUALITY CONTROL AND TESTS

- A. Section 014000 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Shop test bolted and welded connections as specified for field quality control tests.
- C. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
 - 1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify bearing surfaces are at correct elevation.
- B. Verify anchors rods are set in correct locations and arrangements with correct exposure for steel attachment.

3.2 PREPARATION

- A. Furnish templates for installation of anchor rods and embedments in concrete and masonry work.

3.3 ERECTION

- A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
- B. Field weld components and shear connectors indicated on Drawings.
- C. Field connect members with threaded fasteners; tighten to snug tight for bearing type connections.
- D. Do not field cut or alter structural members without approval of Architect/Engineer.
- E. After erection, touch up welds and abrasions to match shop finishes.

3.4 GROUT INSTALLATION

- A. Shim bearing plates and equipment supports to proper elevation, snug tighten anchor bolts.
- B. Fill void under bearing surface with grout. Install and pack grout to remove air pockets.
- C. Moist cure grout.
- D. Remove forms after grout is set. Trim grout edges to form smooth surface, splayed 45 degrees.

3.5 INSTALLING METAL BAR GRATINGS

- A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
- B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.
- C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.6 FIELD QUALITY CONTROL

- A. Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports.
 - 1. Testing agency will conduct and interpret tests and state in each report whether tested work complied with or deviates from requirements.
- B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements at no additional cost to the Owner.
- C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.
- D. Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 1. Direct-tension indicator gaps will be verified to comply with ASTM F 592, Table 2.
- E. In addition to visual inspection, field welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.
 - 1. Liquid Penetrant Inspection: ASTM E165.
 - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - 3. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
 - 4. Ultrasonic inspection: ASTM E 164.
- F. In addition to visual inspection, field welded shear connectors will be inspected and tested according to requirements of AWS D1.1 for stud welding and as follows:
 - 1. Bend test will be performed when visual inspections reveal either less than a continuous 360 degree flash or welding repairs to any shear connector.
 - 2. Tests will be conducted on additional shear connectors when weld fracture occurs on shear connectors already tested, according to requirements of AWS D1.1
- G. Contractor shall furnish all necessary staging, platforms, ladders, or other items necessary to facilitate the testing laboratory in testing and inspecting the work.

- H. The testing laboratory shall inspect 15% of the field full penetration welds, except at truss splices where 100% shall be inspected. All tested welds shall pass.
- I. The testing laboratory shall inspect 50% of the fillet welds and spot check gauge and length of all welds.

3.7 CLEANING

- A. Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 - 1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.
- B. Touch up all hot dipped galvanized steel with high zinc dust content paint.
 - 1. For re-galvanizing welds and steel, comply with SSPC-Paint 20.

END OF SECTION

SECTION 05 21 00

STEEL JOISTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. K-series and LH-series open web steel joists.
 - 2. Bracing.
- B. Related Sections:
 - 1. Section 051200 - Structural Steel.
 - 2. Section 053100 - Steel Decking.

1.2 REFERENCES

- A. FS TT-P-664D -- Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant; 1988.
- B. SJI Technical Digest No. 9 -- Handling and Erection of Steel Joists and Joist Girders; Steel Joist Institute; July 1987. Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders; Steel Joist Institute (SJI); 1990.
- C. Steel Structures Painting Manual, Volume 2, Systems and Specifications; Steel Structures Painting Council (SSPC); 1991.

1.3 SYSTEM DESCRIPTION

- A. Provide joist system which is designed and fabricated to comply with requirements of the contract documents and which strictly conforms to material, manufacturing, and erection requirements of the Steel Joist Institute's (SJI) "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders" (referred to hereinafter as SJI "Specifications").
 - 1. Wind uplift: Design joists and connections to comply with wind uplift requirements indicated.

1.4 SUBMITTALS

- A. Product Data: Submit for each distinct type of joist required and for accessories.
- B. Shop Drawings: Drawings for fabrication and erection of joists; include plans, elevations, and large scale details of typical sections, special connections, joining, and accessories.
 - 1. Show location and spacing of joists; indicate mark number and type.
 - 2. Show bridging.
- C. Quality Control Submittals: Submit the following:
 - 1. SJI certification of joist characteristics.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Strictly conform to requirements of SJI Technical Digest No. 9.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Steel: Conform to requirements of SJI "Specifications."
- B. Steel Primer Joists: Rust-inhibitive, lead and chromate free, low VOC primer, complying with FS TT-P-664, or equivalent.
- C. Accessories: Provide accessories required for erection of steel joists, complying with SJI "Specifications" and with contract documents.

2.2 JOIST FABRICATION

- A. General: All materials shall be clean and straight.
- B. Bridging is schematically shown on drawings. Detail and fabricate bridging in complete accordance with SJI requirements.
- C. Joists:
 - 1. Top chord extensions: Provide extensions where indicated. Extension members shall be designed as cantilever beams, with their reactions carried back at least to the first panel point of the joists.
 - 2. Bottom chords: Form bottom chord members of joists using angles.
 - 3. Bottom chord extensions: Where indicated, provide extended bottom chords or separate extension units properly designed to support ceilings attached directly to joist bottom chords. Maximum clearance between wall finish and end of extension: 1/2 inch, unless indicated otherwise.
 - 4. Special end connections: Provide special end connections where joists bear less than 2-1/2 inches over steel supports. Connections shall provide positive attachment to the support.
 - 5. Surface preparation for shop priming: SSPC-SP 2: Hand tool cleaning.
 - 6. Shop priming: Apply primer in accordance with paint manufacturer's recommendations.

PART 3 EXECUTION

3.1 ERECTION

- A. Do not begin joist erection until structural support components have been installed and are in suitable condition to receive joists.
- B. Do not overload or exceed carrying capacity of any joist during construction period.
- C. Accurately position and space joists before permanent attachment to structural supports.
- D. Provide safe, stable structure throughout construction period. Do not remove bridging after construction is completed, unless specifically authorized to do so by the architect.
 - 1. Install bridging in accordance with SJI requirements.
 - 2. Bridging installation shall proceed concurrently with joist erection and shall be completed before joists are subjected to construction loads.
- E. Joist Anchorage:
 - 1. Anchor joists to structural support members as indicated on drawings.

END OF SECTION

SECTION 05 31 00

STEEL DECK

PART 1 GENERAL

1.1 SCOPE

- A. This work shall consist of furnishing all plant, labor, materials, equipment, and apparatus for the installation of all steel roof decking and composite floor decking with accessories indicated, specified, and/or reasonably implied for a complete, first-quality job.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 033000 – Cast-in-Place Concrete
- B. Section 051200 - Structural Steel
- C. Section 052100 - Steel Joists

1.3 REFERENCE SPECIFICATIONS

- A. "Specification for the Design of Light Gage Cold-Formed Steel Structure Members" of the American Institute of Steel Construction.
- B. "Code of Recommended Standard Practice" of the Steel Deck Institute.
- C. Specifications and commentary for composite steel floor deck of the Steel Deck Institute.
- D. Specifications and commentary for steel roof deck of the Steel Deck Institute.
- E. Structural Welding Code - Sheet steel of the American Welding Society.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Qualifications of Welding: Use qualified processes and welding operators in conformance with AWS "Welder Qualification" procedures.
- C. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated
- D. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
 - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency
- E. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- F. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

- G. Welding Inspection: All decking welds shall be inspected by the Architect prior to covering. Notify the Architect in writing forty-eight (48) hours prior to completing welds for each major area.

1.5 SUBMITTALS

- A. Shop and Erection Drawings shall be submitted for all metal decking to the Architect for approval. Drawings shall indicate layout, types of specified materials and accessories, gauges to be supplied, anchorage details, all conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories. Drawings shall include layout for all shear studs to be applied through deck units. Manufacture or fabricating of any materials or the performing of any work prior to the approval of shop drawings will be entirely at the risk of the Contractor.
- B. Product Data: For each type of deck, accessory, and product indicated
- C. The Contractor shall submit the manufacturer's specifications, load tables, and installation instructions for each type specified.
- D. Welding certificates and welding procedures (WPS)
- E. Field quality-control test and inspection reports.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Steel deck units shall be protected against damage in transit to the jobsite.
- B. If site storage is necessary, steel deck units shall be stacked on wood blocking clear of the ground and tilted slightly to insure against the entrapment of water.
- C. The steel deck units shall be hoisted to each individual floor as required and rough spread.

PART 2 PRODUCTS

2.1 ROOF DECK

- A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
 1. Galvanized Steel Sheet: ASTM A653, Structural Steel (SS), Grade 33.
 2. Galvanizing: ASTM A 525, G60.
 3. Deck Profile: As indicated in drawings.
 4. Profile Depth: As indicated in drawings.
 5. Design Uncoated-Steel Thickness: As indicated in drawings.
 6. Span Condition: Triple span or more unless noted in drawings.
 7. Side Laps: Overlapped.

2.2 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Weld Washers: Mild steel, uncoated, sized as recommended by manufacturer of steel deck units.
- C. Mechanical Fasteners: Stainless steel, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

- D. Side-Lap Fasteners: Stainless steel, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile indicated.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.
- I. Galvanizing Repair Paint: High zinc-dust content paint formulated specifically for repair of damaged galvanized surfaces. Prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- J. Holes for openings: Deck shall be cut by the Contractor to fit large framed openings which are located by dimension on the structural design drawings. Holes required by other trades shall be supplied at the expense of those trades. The trade involved shall notify the Architect/Engineer regarding the size, location and number of holes so that the structural adequacy of the steel deck units and/or composite slab can be checked. Holes shall be

cut in floor deck units only after concrete has been placed and 75% of design strength attained.

3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members as indicated on the drawings
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated on the drawings.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum.
- D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- E. Flashing: The steel deck manufacturer shall furnish sheet metal flashings to close openings between deck units and columns, deck units and girders, and openings which occur where deck abut. These flashings shall be welded in position by the steel deck installer.
- F. Roof Sump Pans: Place over openings provided in roof decking and weld to top decking surface. Space welds not more than 12" with at least one weld at each corner.
- G. Closure Strips: Provide flexible closure strips at open uncovered ends and edges of roof decking also in voids between decking and other construction. Install with adhesive in accordance with manufacturer's instructions.

3.4 FIELD QUALITY CONTROL

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

3.5 REPAIRS AND PROTECTION

- A. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Division 9 Section "Interior Painting."
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 40 00
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes formed steel stud exterior wall framing.
- B. Related Requirements:
 - 1. Section 07 21 00 - Thermal Insulation: Thermal insulation within framing members.
 - 2. Section 07 43 13 - Metal Soffit Panels.
 - 3. Section 09 21 16 - Gypsum Board Assemblies:
 - a. Light weight, non-load bearing metal stud framing.
 - b. Acoustic attenuation insulation for interior construction that does not require a thermal barrier between two conditioned spaces.

1.2 REFERENCES

- A. American Iron and Steel Institute:
 - 1. AISI General - Standard for Cold-Formed Steel Framing - General Provisions.
 - 2. AISI Header - Standard for Cold-Formed Steel Framing - Header Design.
 - 3. AISI NAS - North American Specification for Design of Cold-Formed Steel Structural Members.
- B. American Society of Civil Engineers:
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International:
 - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
 - 2. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
 - 3. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
- D. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.
 - 2. AWS D1.3 - Structural Welding Code - Sheet Steel.
- E. California Department of Health Services:
 - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- F. National Association of Architectural Metal Manufacturers:
 - 1. NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual.
- G. SSPC: The Society for Protective Coatings:
 - 1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
- H. Steel Stud Manufacturers Association:
 - 1. SSMA - Product Technical Information.

1.3 SYSTEM DESCRIPTION

- A. Size components to withstand design loads in accordance with ASCE 7.

- B. Maximum Allowable Deflection: $1/360$ of span.
- C. Wall System:
 - 1. Design to AISI NAS, AISI General, and AISI Header.
 - 2. Design to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
 - 3. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
 - 4. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable code.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Shop Drawings:
 - 1. Indicate component details, framed openings, bearing, anchorage, loading, type and location of fasteners, and accessories or items required of related Work.
 - 2. Describe method for securing studs to tracks and for bolted framing connections.
 - 3. Delegated Design Drawings of the metal framing components and systems, designed and sealed by a Professional Engineer experienced in design of this Work and licensed in the State in which the Work is constructed.
- C. Product Data: Submit data on standard framing members; describe materials and finish, product criteria, and limitations.
- D. Manufacturer's Installation Instructions: Submit special procedures and perimeter conditions requiring special attention.

1.5 QUALITY ASSURANCE

- A. Calculate structural properties of framing members in accordance with AISI NAS.
- B. Furnish framing materials in accordance with SSMA - Product Technical Information.
- C. Perform Work in accordance with the following:
 - 1. Framing: AISI General and AISI NAS.
 - 2. Headers: AISI Header.
 - 3. Wall Studs: AISI WSD.
 - 4. Lateral Design: AISI Lateral.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
 - 1. Current member of Steel Stud Manufacturers Association.
- B. Installer: Company specializing in performing Work of this section with minimum five (5) years documented experience.
- C. Delegated Design Requirement: Metal framing components and systems to be designed and sealed by a Professional Engineer experienced in design of the requirements of this Section and licensed in State in which the Work is constructed.
- D. Form, fabricate, provide, and connect components in accordance with NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual.

1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate placement of components within stud framing system specified in other Sections.

PART 2 PRODUCTS

2.1 COLD-FORMED METAL FRAMING

- A. Manufacturers:
 - 1. Clark Dietrich Building Systems.
 - 2. Craco Manufacturing, Inc.
 - 3. Marino\Ware.
 - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Cold-Formed Metal Framing: ASTM C955.

2.2 FRAMING COMPONENTS

- A. Steel Sheet: ASTM A1003/A1003M; Structural Grade, Type H, metallic coated:
 - 1. Grade: ST50H, minimum.
 - 2. Hot dipped galvanized coating in accordance with ASTM A653/A653M.
 - a. G60/Z180 galvanized.
- B. Studs: Steel sheet, formed to channel shape, punched web,; size and thickness as shown on Drawings or as required for design loads.
- C. Track: Steel sheet, formed to channel shape; same width as studs, tight fit; thickness to match studs, solid web.

2.3 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined by performance requirements specified.
- B. Plates, Gussets, Clips: Formed sheet steel, thickness determined by performance requirements specified.
- C. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.
 - 1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

2.4 FASTENERS

- A. Self-drilling, Self-tapping Screws, Bolts, Nuts, and Washers: Steel, hot dip galvanized.
- B. Anchorage Devices: Power actuated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify substrate surfaces building framing components are ready to receive Work.

- C. Verify rough-in utilities are in proper location.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 ERECTION OF STUDS

- A. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches o.c.
- B. Place studs at 16 inches o.c.; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using fastener method.
- C. Construct corners using minimum three studs. Double stud wall openings, door jambs, and window jambs.
- D. Erect load bearing studs one piece full length. Splicing of studs is not permitted.
- E. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.
- F. Fully seat axial loaded studs in receiving tracks (maximum 1/16 inch gap between stud and track web).
- G. Coordinate placement of insulation in multiple stud spaces after erection.
- H. Install intermediate studs above and below openings to align with wall stud spacing.
- I. Install studs with deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- J. Attach cross studs to studs for attachment of fixtures anchored to walls.
- K. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- L. Complete framing ready to receive wall sheathing.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Indicated Position: 1/4 inch.
- C. Maximum Variation of Members from Plane: 1/4 inch.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes shop fabricated metal items:
 - 1. Lintels.
 - 2. Ledge and shelf angles.
 - 3. Bollards.
 - 4. Ladders.
 - 5. Structural supports for miscellaneous attachments.
 - 6. Anchor bolts for sill plates.

- B. Related Requirements:
 - 1. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for embedded anchors and attachments for metal fabrications specified by this section in concrete.
 - 2. Section 04 20 00 - Unit Masonry: Execution requirements for embedded anchors and attachments for metal fabrications specified by this section in masonry.
 - 3. Section 05 12 00 - Structural Steel: Structural steel column anchor bolts.
 - 4. Section 05 21 00 - Steel Joist: Structural joist bearing plates, including anchorage.
 - 5. Section 05 31 00 - Steel Deck: Bearing plates for metal deck bearing, including anchorage.
 - 6. Section 05 52 00 - Metal Railings.
 - 7. Section 09 90 00 - Painting and Coating: Field applied paint finish.

1.2 REFERENCES

- A. American Architectural Manufacturers Association:
 - 1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
 - 2. AAMA 611 AA-M12C22A41: Clear anodic coating.

- B. American National Standards Institute:
 - 1. ANSI A14.3 - Ladders - Fixed - Safety Requirements

- C. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 5. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - 6. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 7. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 - 8. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - 9. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
 - 10. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings.
 - 11. ASTM B85 - Standard Specification for Aluminum-Alloy Die Castings.

12. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 13. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
 14. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
 15. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes, 2014.
 16. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 17. ASTM F436 - Standard Specification for Hardened Steel Washers.
 18. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- D. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
 2. AWS D1.1 - Structural Welding Code - Steel.
 3. AWS D1.2 - Structural Welding Code - Aluminum.
- E. California Department of Health Services:
1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- F. National Ornamental & Miscellaneous Metals Association:
1. NOMMA Guideline 1 - Joint Finishes.
- G. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.
 2. SSPC Paint 15 - Steel Joist Shop Paint.
 3. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.4 QUALITY ASSURANCE

- A. Where anchors or support brackets to structure penetrate finish and moisture protection materials, coordinate fabrication of those finish and moisture protection materials to allow for weather sealed finish condition (i.e. ladders, etc.)
- B. Finish joints in accordance with NOMMA Guideline 1.
- C. Perform Work in accordance with applicable codes and standards in the State in which the project is located.
- D. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

- A. Design under direct supervision of Professional Engineer experienced in design of this Work and licensed in State in which the project is located.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept metal fabrications on site in labeled shipments. Inspect for damage.
- C. Protect metal fabrications from damage by exposure to weather.

1.7 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

- A. Structural W-Shapes: ASTM A992/A992M.
- B. Structural Shapes: ASTM A36/A36M.
- C. Channels and Angles: ASTM A36/A36M.
- D. Steel Plate: ASTM A36/A36M.
- E. Hollow Structural Sections: ASTM A500/A500M, Grade B.
- F. Steel Pipe: ASTM A53/A53M, Grade B, Schedule 40.
- G. Sheet Steel: ASTM A653/A653M, Grade 33 Structural Quality, galvanized with coating class.
- H. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436 washers.
- I. Structural Bolts, Nuts and Washers: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M, Class B.
- J. Welding Materials: AWS D1.1; type required for materials being welded.
- K. Shop Primer: SSPC Paint 15, Type 1, red oxide.
- L. Touch-Up Primer: Match shop primer.
 - 1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- M. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.
 - 1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

2.2 MATERIALS – ALUMINUM

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
- B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.

- C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210 (ASTM B210M), 6063 alloy, T6 temper.
- D. Aluminum-Alloy Bars: ASTM B211 (ASTM B211M), 6061 alloy, T6 temper.
- E. Aluminum-Alloy Sand Castings: ASTM B26/B26M.
- F. Aluminum -Alloy Die Castings: ASTM B85/B85M.
- G. Bolts, Nuts, and Washers:
 - 1. Stainless steel.
- H. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.3 LINTELS

- A. Lintels: Steel sections, size and configuration as indicated on Drawings, length to allow 8 inches minimum bearing on both sides of opening.
 - 1. Exterior Locations: Finish to ASTM A123/A123M, hot dip galvanized after fabrication.
 - 2. Interior Locations: Finish to be primer paint, two coats.

2.4 LEDGE AND SHELF ANGLES

- A. Ledge and Shelf Angles Not Attached to Structural Framing: For support of masonry; galvanized.
 - 1. Exterior Locations: Finish to ASTM A123/A123M, hot dip galvanized after fabrication.
 - 2. Interior Locations: Finish to be primer paint, two coats.

2.5 ELEVATOR SILL ANGLES AND HOIST AND DIVIDER BEAMS

- A. Sill Angles: Steel sections as indicated on Drawings for support of elevator sills; hot-dip galvanized.
- B. Hoist and Divider Beams: Steel wide flange sections, shape and size required to support applied loads with maximum deflection of 1/240 of the span; prime paint, two coats.

2.6 BOLLARDS

- A. Bollards: 6 inch diameter steel pipe, galvanized after fabrication; 3,000 psi concrete filled; smooth dome shaped concrete cap; length and base securement as indicated on Drawings.
 - 1. Paint: DOT yellow color; one coat primer; two coats top coat, gloss (including cap).
 - 2. Acceptable Alternative Concrete Dome Shaped Cap:
 - a. Precast 5,000 psi concrete reinforced with micro fibers.
 - b. Class A form smooth dome shape finish.
 - c. Diameter: Equal to outside diameter of steel pipe bollard.
 - d. Galvanized anchor bolt cast into center of base of cap (for setting into bollard uncured concrete fill).

2.7 LADDERS

- 1. Aluminum Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
 - a. Components: Manufacturer's standard side rails, rungs, treads, handrails. returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.
 - b. Materials: Aluminum; ASTM B221 (ASTM B221M), 6063 alloy, T52 temper.

- c. Mounting: Space rungs 7 inches from wall surface; with metal mounting brackets and attachments. Mounting brackets attached as indicated on Drawings, but not greater than 36 inches apart.
- d. Finish:
 - 1) Clear anodized coating in compliance with AAMA 611, Class 1.

2.8 STRUCTURAL SUPPORTS

- A. Other Structural Supports: Steel sections, shape and size as indicated on Drawings required to support applied loads with maximum deflection of 1/240 of the span; prime paint, one coat.

2.9 ANCHOR BOLTS

- A. Anchor Rods: ASTM A307; Grade A.
 - 1. Shape: Hooked and straight.
 - 2. Furnish with nut and washer; unfinished.

2.10 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- G. Railing Assemblies, wall rails, and attachments to resist force of 75 lbs at any point without damage or permanent set.

2.11 FACTORY APPLIED FINISHES

- A. Finishes as follows unless indicated otherwise on Drawings or in component description in this Section.
- B. Steel - Interior Use:
 - 1. Shop Prime Paint items with two coats except where galvanizing is specified.
 - a. Prepare surfaces to be primed in accordance with SSPC SP 2.
 - b. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
 - c. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.
- C. Steel - Exterior Use:
 - 1. Galvanizing: ASTM A123/A123M; minimum 1.7 oz/sq ft coating thickness; hot dip galvanized after fabrication.
 - 2. Galvanizing for Fasteners, Connectors, and Anchors: Hot dip galvanized to ASTM A153/A153M, Class B, unless specifically indicated as Mechanical Galvanized.
 - a. Mechanical Galvanizing: ASTM B695; Class 50 minimum.
- D. Aluminum:
 - 1. Exterior Aluminum Surfaces: Class I natural anodized.

2. Interior Aluminum Surfaces: Class I natural anodized.
3. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.12 FABRICATION TOLERANCES

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

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify field conditions are acceptable and are ready to receive Work.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Clean and strip primed steel items to bare metal where site welding is required.
- D. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.
- C. Field weld components indicated on shop drawings.
- D. Perform steel field welding in accordance with AWS D1.1 – Structural Welding Code.
- E. Perform aluminum field welding in accordance with AWS D1.2 – Structural Welding Code.
- F. Obtain approval of Architect prior to site cutting or making adjustments not scheduled.
- G. After erection, touch up welds, abrasions, and damaged finishes:
 1. Steel - Apply prime paint or galvanizing repair paint to match shop finishes.
 2. Aluminum – Repair finish to match shop finishes.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Plumb: 1/4 inch per story or for every 12 feet in height whichever is greater, non-cumulative.
- C. Maximum Offset From Alignment: 1/4 inch.

- D. Maximum Out-of-Position: 1/4 inch.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Monitor quality of installation and testing.
- B. Welding: Inspect steel welds in accordance with AWS D1.1.
- C. Welding: Inspect aluminum welds in accordance with AWS D1.2.

END OF SECTION

SECTION 05 52 00.11

METAL RAILINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. This Section applies to metal railing requirements that are not indicated in other Sections of the Work.
 - 2. Floor and wall mounted handrails, balustrades and guardrails at stairs, ramps and vertical edges; and as indicated on Drawings.
- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete. Floor mounting handrailings and guardrails.
 - 2. Section 04 20 00 - Unit Masonry. Wall mounting handrailings and guardrails.
 - 3. Section 05 50 10 - Metal Fabrications.
 - 4. Section 06 20 00 - Finish Carpentry: Wood handrail cap for handrails where Drawing indicate wood handrail.
 - 5. Section 09 90 00 - Painting and Coating: Paint finish.

1.2 REFERENCES

- A. Americans with Disabilities Act (ADA):
 - 1. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; current edition.
- B. American Institute of Steel Construction (AISC):
 - 1. AISC 201 - AISC Certification Program for Structural Steel Fabricators Standard for Steel Building Structures; 2006.
- C. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
 - 2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
 - 3. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
 - 4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016.
 - 5. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2017.
 - 6. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength; 2014.
 - 7. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
 - 8. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.
 - 9. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2019.
- D. American Welding Society:

1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
 2. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020.
 3. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel; 2017.
- E. California Department of Health Services:
1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- F. International Accreditation Service, Inc. (IAS):
1. IAS AC172 - Accreditation Criteria For Fabricator Inspection Programs For Structural Steel; 2019
- G. National Ornamental & Miscellaneous Metals Association:
1. NOMMA Guideline 1 - Joint Finishes.
- H. SSPC: The Society for Protective Coatings:
1. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
 2. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic, and Type II - Organic); 2019.

1.3 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this Section. Review the work requirements, application procedures, quality control, testing and inspection and production schedule.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Welder's Qualification Statement.
- D. Fabricator's Qualification Statement.

1.5 QUALITY ASSURANCE

- A. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous twelve (12) months.
- B. Fabricator Qualifications:
 1. Qualified steel fabricator that is certified under AISC 201 or IAS AC172.
 2. Company specializing in manufacturing products specified in this section, with not less than five (5) years of documented experience.

1.6 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable accessibility requirements of ADA Standards.

- B. Provide railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
- C. Design and install railing assemblies, wall mounted rails, and attachments to resist force loads without damage or permanent set when tested in accordance with ASTM E935.
 - 1. Distributed Force Loads: 75 pounds per linear foot (1095 N/m) applied to the top of the assembly and in any direction.
 - 2. Concentrated Force Loads: 200 pounds (890 N) applied at any point on the top of the assembly and in any direction.
- D. Railing shapes, heights, profiles, configurations, and component members to be in compliance with applicable codes and as indicated on Drawings.
 - 1. Unless indicated otherwise on Drawings, round tube railings to be 1-1/2 inch diameter.

2.2 COMPONENTS

- A. Sizes, shapes, and configurations to be as indicated on Drawings.

2.3 MATERIALS

- A. Steel Components:
 - 1. Steel Bars, Plates, Channels, and Angles: ASTM A36/A36M.
 - 2. Steel Round and Rectangular Tubing:
 - a. ASTM A501/A501M, hot-formed.
 - 3. Steel Structural Pipe:
 - a. ASTM A53/A53M, Grade B, Schedule 40.
 - 4. Fasteners, Bolts, Nuts and Washers:
 - a. ASTM F3125/F3125M; Grade A325, Type 1, 120 ksi minimum tensile strength.
- B. Stainless Steel Components:
 - 1. Stainless Steel Sheet, Strip, Plate, and Flat Bar: ASTM A666, Type 304.
 - 2. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.
 - 3. Fastener, Bolts, Nuts and Washers: Stainless steel compatible with components to be fastened.
- C. Welding Materials: AWS D1.1/D1.1M and other AWS standards applicable to materials to be welded.

2.4 FABRICATION

- A. Fit and shop assemble components in largest practical sections, for delivery to site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Continuously seal joined pieces by intermittent welds and plastic filler.
- D. Exposed Welded Joints: NOMMA Guideline 1 Joint Finish 1.
 - 1. No evidence of weld.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

- G. Accurately form components required for anchorage of stairs and landings and railings to each other and to building structure.

2.5 SHOP FINISHING

- A. Galvanized Components: Applies to all exterior items.
 - 1. Galvanized Steel: Hot-dip galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
 - 2. Galvanized Steel Fasteners, Bolts, Nuts, and Washers: Hot-dip galvanize after fabrication to ASTM A153/A153M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
 - 3. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type II - Organic with zinc dust at Level 2 (77 percent zinc dust, minimum).
 - 4. Provide shop applied primer for items indicated on Drawings for painted finish.
- B. Ungalvanized Components: Applies to all interior items, unless indicated on Drawings to be galvanized.
 - 1. Provide Shop Primer Coating: SSPC Paint 15, Type 1, red oxide; two coats.
 - a. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
 - 1) Remove surface contamination and oils and wash with solvent in accordance with SSPC-SP 1.
 - 2) Prepare surface in accordance with SSPC-SP 2, hand tool cleaning.
 - 2. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
 - 3. Touch-Up Primer: Match shop primer.
- C. Stainless Steel Components:
 - 1. Provide No. 4 satin brushed finish.

2.6 FIELD FINISHING

- A. Field applied paint finish coats as indicated in Section 09 90 00 - Painting and Coating; color as selected by Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify field conditions are acceptable and are ready to receive work.
- C. Verify concealed blocking and reinforcement is installed and correctly located to receive wall mounted handrails.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Clean and strip primed steel items to bare metal where site welding is required.
- D. Supply items required to be cast into concrete and or embedded in masonry with setting templates.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- C. Install components with true alignment, plumb and level, accurately fitted, free from distortion or defects.
- D. Install anchors, angles, struts and blocking as required for connecting stairs to structure.
- E. Core-drill concrete floor to receive vertical support of railings. Insert vertical supports to depths and grout securely as indicated on Drawings.
- F. Secure wall-mounted railings as indicated on Drawings.
- G. Allow for erection loads. Install sufficient temporary bracing to maintain framing safe, plumb, and in alignment.
- H. Field weld components indicated on shop drawings. Perform field welding in accordance with AWS D1.1/D1.1M and other AWS standards applicable to the materials to be welded.
- I. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- J. Mechanically fasten joints butted tight, flush, and hairline.
- K. Grind welds smooth and flush.
- L. Prime welds, abrasions, and otherwise damaged shop primed or galvanized coatings with indicated touch-up coating.
- M. Obtain approval of Architect prior to site cutting or creating adjustments not scheduled.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- C. Maximum Offset From True Alignment: 1/4 inch.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.

END OF SECTION

SECTION 06 10 53

MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Roof curbs and perimeter nailers.
 - 2. Blocking in wall and roof openings.
 - 3. Communications and electrical panel back boards.
 - 4. Fire-retardant treatment of wood.
 - 5. Preservative treatment of wood.
- B. Related Requirements:
 - 1. Specification sections related to roofing curbs, roofing and roof decking construction.

1.2 REFERENCES

- A. American Wood-Preservers' Association:
 - 1. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.
- B. ASTM International:
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. Southern Pine Inspection Bureau:
 - 1. SPIB - Standard Grading Rules for Southern Pine Lumber: 2014.
- D. U.S. Department of Commerce - National Institute of Standards and Technology:
 - 1. DOC PS 1 - Structural Plywood; 2009.
 - 2. DOC PS 2 - Performance Standard for Wood-based Structural-Use Panels; 2010.
 - 3. DOC PS 20 - American Softwood Lumber Standard; 2015.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit technical data on wood preservative and fire retardant treatment materials and application instructions.

1.4 QUALITY ASSURANCE

- A. Grading Agency: Any grading agency acceptable to the Authority Having Jurisdiction and whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Perform Work in accordance with the following:
 - 1. Dimension Lumber: Comply with DOC PS 20 and requirements of specified grading agencies.
 - 2. Wood Construction Panels:
 - a. Plywood: Comply with DOC PS 1 and requirements of specified grading agencies.
 - b. Oriented Strand Board (OSB): Comply with DOC PS 2 and requirements of specified grading agencies.
- C. Surface Burning Characteristics:

1. Fire Retardant Treated Materials: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- D. Apply label from agency approved by Authority Having Jurisdiction to identify each preservative treated and fire retardant treated material.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Lumber Grading Rules: SPIB.
- B. Miscellaneous Framing: Southern Yellow Pine species, No. 2 grade, 19 percent maximum moisture content.
- C. Plywood: APA/EWA Rated Sheathing, Grade C-D; Exposure Durability 1; sanded.

2.2 ACCESSORIES

- A. Fasteners and Anchors:
 1. Fasteners: Hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
 2. Nails: ASTM F1667.
 3. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.

2.3 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Fire Retardant Treatment:
 1. Exterior Type: AWWA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 2. Interior Type: AWWA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treatment required for materials as indicated on Drawings.
- C. Preservative Treatment:

1. Preservative Pressure Treatment of Lumber Above Grade: AWP A U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.10 lb/cu ft retention.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber as indicated on Drawings.
 - c. Treat lumber exposed to weather.
 - d. Treat lumber in contact with roofing, flashing or waterproofing.
 - e. Treat lumber in contact with masonry or concrete.
 - f. Treat lumber less than 18 inches above grade.
2. Preservative Pressure Treatment of Plywood Above Grade: AWP A U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft retention.
 - a. Kiln dry plywood after treatment to maximum moisture content of 15 percent.
 - b. Treat plywood as indicated on Drawings.
 - c. Treat plywood in contact with roofing, flashing or waterproofing.
 - d. Treat plywood in contact with masonry or concrete.
 - e. Treat plywood less than 18 inches above grade.
3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWP A U1, Use Category UC4A, Commodity Specification A using waterborne preservative to 0.31 lb/cu ft retention.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber as indicated on Drawings.
 - c. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
 - d. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify substrate conditions are ready to receive blocking, curbing and framing.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Coordinate placement of blocking, curbing and framing items.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Set members level and plumb, in correct position.
- C. Place horizontal members, crown side up.
- D. Except where prefabricated roof curbs are indicated and unless specified otherwise in specification sections for roofing construction, construct curb members of solid wood sections and form corners by alternating lapping side members.
- E. Coordinate curb installation with installation of decking and support of deck openings, and parapet construction.

- F. Communications and Electrical Room Mounting Boards: Coordinate and size mounting boards 12 inches beyond size of panels, devices and wiring to be mounted.

3.4 SCHEDULES

- A. Roof Blocking: Unless specified otherwise in specification sections for roofing; Southern Yellow Pine species, 19 percent maximum moisture content, pressure preservative treatment.
- B. Communications and Electrical Room Mounting Boards: DOC PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; Fire Retardant Treated as specified in this Section.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Finish carpentry items.
 - 2. Wood trim.
 - 3. Hardware and attachment accessories for finish carpentry items not specified in other Sections of the Work.

- B. Related Requirements:
 - 1. Section 05 22 00.11 - Metal Railings: Wood capped handrails.
 - 2. Section 06 10 53 - Miscellaneous Rough Carpentry: Grounds and support framing.
 - 3. Section 08 14 16 - Flush Wood Doors.
 - 4. Section 09 90 00 - Painting and Coating: Painting and finishing of finish carpentry items.
 - 5. Section 12 32 16 - Manufactured Plastic-Laminate-Faced Casework: Shop fabricated cabinet work.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A135.4 - Basic Hardboard.
 - 2. ANSI A156.9 - Cabinet Hardware.
 - 3. ANSI A208.1 - Mat-Formed Wood Particleboard.

- B. Architectural Woodwork Institute:
 - 1. AWI - Quality Standards Illustrated, 8th Edition, Version 2.0; 2005.

- C. ASTM International:
 - 1. ASTM C1036 - Standard Specification for Flat Glass.
 - 2. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
 - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

- D. American Wood Protection Association:
 - 1. AWPA U1 - Use Category System: User Specification for Treated Wood, 2017.

- E. American Woodwork Institute:
 - 1. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
 - 2. AWI (QCP) - Quality Certification Program, current edition at www.awigcp.org.

- F. California Department of Health Services:
 - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

- G. Forest Stewardship Council:
 - 1. FSC Guidelines - Forest Stewardship Council Guidelines.

- H. National Electrical Manufacturers Association:
 - 1. NEMA LD 3 - High Pressure Decorative Laminates.

- I. U.S. Department of Commerce - National Institute of Standards and Technology (NIST):
 - 1. DOC PS 1 - Structural Plywood; 2019.

2. DOC PS 2 - Performance Standard for Wood-based Structural-Use Panels; 2019.
3. DOC PS 20 - American Softwood Lumber Standard; 2020.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit the following data:
 1. Veneer materials.
 2. Fire retardant treatment materials and application instructions.
 3. Finish materials.
 4. Attachment hardware, and finish hardware.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, and to minimum scale of 1-1/2 inch equals 1 foot.
 1. Provide the information required by AWI/AWMAC/WI (AWS).
- D. Samples for Initial Selection: Two manufacturer's color samples illustrating the full range of finishes, patterns and colors available for each finish surface type, trim and hardware indicated; submit for Architect's initial selections.
 1. For clear coats on stained wood, samples to illustrate range of stain colors and sheens available as applied to wood species required in construction.
 2. For clear coats on non-stained wood, samples to illustrate sheens available as applied to wood species required in construction.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish, pattern and color; minimum 4 x 4 inch samples and actual trim and hardware. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Certificates:
 1. Submit copy of fabricator's AWI Quality Certification Program license and Project specific letters to the Architect.
 2. Submit labels and certificates required by quality assurance and quality control programs.

1.4 QUALITY ASSURANCE

- A. Provide products and work of quality specified in accordance with AWI/AWMAC/WI (AWS).
 1. Maintain one copy of each document on site.
- B. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
 1. Provide labels or certificates indicating that the work complies with AWI/AWMAC/WI (AWS) requirements for grade or grades specified.
 2. Provide designated labels on shop drawings as required by certification program.
 3. Provide designated labels on installed products as required by certification program.
 4. Submit certifications upon completion of installation that verifies this work complies with specified requirements.

1.5 QUALIFICATIONS

- A. Fabricator: Company specializing in fabricating Products indicated with minimum five (5) years documented experience and certified by AWI Quality Certification Program.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect work from moisture damage.

1.7 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.8 SEQUENCING

- A. Section 01 30 00 - Administrative Requirements and Section 00 10 00 - Summary: Scheduling and sequencing.
- B. Sequence work to ensure utility connections are achieved in orderly and expeditious manner.

1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.
- C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Quality Standard: Comply with the following grade in accordance with AWI/AWMAC/WI (AWS), unless otherwise indicated.
 - 1. Premium Grade
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

2.2 COMPONENTS

- A. Softwood Lumber: DOC PS 20, maximum moisture content of 6 - 8 percent; with vertical grain, of quality suitable for transparent finish; and the following:
 - 1. Species of Wood:
 - a. Southern Yellow Pine.
 - 2. Cut or Slicing of Wood:
 - a. Mixed.
- B. Hardwood Lumber: AWI Grade I; maximum moisture content 6 - 8 percent; with vertical grain, of quality suitable for transparent finish; and the following:
 - 1. Species of Wood:
 - a. Red Oak.
 - 2. Cut or slicing of Wood:
 - a. Plain Sawn.
- C. Softwood Plywood: DOC PS 1 Grade B-B softwood plywood, veneer core; type of glue recommended for application; and the following:
 - 1. Species of Veneer:
 - a. Fir.
 - 2. Cut or Slicing of Veneer:

- a. Mixed.
- 3. Interior Composite Wood Products: Meets California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- D. High Pressure Decorative Laminate: NEMA LD 3, GP50 for horizontal surfaces, GP28 for vertical surfaces, CL20 for cabinet liner surfaces, BK20 for undecorated backing sheets, face color, pattern as selected and matte surface texture.
 - 1. Colors:
 - a. All Vertical Surfaces:
 - 1) As selected by Architect from submitted samples.
 - b. All Horizontal Surfaces:
 - 1) As selected by Architect from submitted samples.
- E. Wood Particleboard: ANSI A208.1 Type 1; composed of wood chips or sawdust, medium density, made with water resistant adhesive; sanded faces.
- F. Hardboard: ANSI A135.4; Pressed wood fiber with resin binder, Class 1 (tempered grade), 1/4 inch thick, smooth one sides (S1S).
- G. Wood Veneer Laminate: Real wood veneer laminated to undecorated backing sheets, vertical grade, gloss polyurethane finish.
 - 1. Color:
 - a. As selected by Architect from submitted samples.
- H. Glass Shelves: ASTM C1048, Kind FT Fully tempered, Condition A, uncoated, Type 1 transparent flat, Class 1 clear, Quality q3 glazing select; with horizontal tempering, arrissed edges.

2.3 ACCESSORIES

- A. Shelf Standards and Fitted Supports: Stainless steel; satin finish.
 - 1. Standards to be formed channels, slotted for fitted supports spaced at 1 inch centers.
- B. Shelf Brackets: Stainless steel; satin finish.
 - 1. Fabricated with angled extension support; pre-drilled and countersunk fastener holes.
- C. Mirror Attachment Accessories: Stainless steel J-profile channels; satin finish.
- D. Adhesive for High Pressure Decorative Laminates: Type recommended by laminate manufacturer to suit application.
 - 1. Interior Adhesives: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- E. Fasteners and Adhesives:
 - 1. Fasteners: Of size and type to suit application; hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
 - a. Nails: ASTM F1667.
 - b. Concealed Joint Fasteners: Threaded steel.
 - 2. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- F. Lumber for Shimming and Blocking: Softwood lumber.
- G. Veneer Edge Band: Standard wood veneer edge band matching face veneer.
- H. Wood Filler: Oil base, tinted to match surface finish color.

- I. Primer: Low VOC alkyd primer sealer type.
 - 1. Interior Primers: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- J. Wood Treatment:
 - 1. Factory-Treated Lumber: Comply with requirements of AWPA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.
 - 2. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
 - 3. Wood Preservative by Pressure Treatment (PT Type): AWPA U1 Treatment using water borne preservative with 0.25 percent retainage.
 - 4. Shop pressure treat wood materials requiring fire rating to concealed wood blocking.
 - 5. Provide identification on fire retardant treated material.
 - 6. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.
- K. Hardware: BHMA A156.9 as follows:
 - 1. Hinges: European style, satin finish.
 - 2. Pulls: Wire style, powder coat finish, color as selected.
 - 3. Drawer Slides: Full suspension style, powder coat finish.
 - 4. Cabinet Locks: Keyed cylinder, two keys for each lock, master keyed, steel with satin finish.

2.4 FABRICATION

- A. Fabricate in accordance with performance requirements indicated.
- B. Shop assemble work for delivery to site, permitting passage through building openings.
- C. Fit exposed sheet material edges with matching veneer edging. Use one piece for full length only.
- D. Cap exposed high pressure decorative laminate finish edges with material of same finish and pattern.
- E. Shop prepare and identify components for book match grain matching during site erection.
- F. When necessary to cut and fit on site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and site cutting.
- G. Apply high pressure decorative laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises.
- H. Apply laminate backing sheet to reverse face of high pressure decorative laminate finished surfaces.
- I. Wood Capped Handrails: Concealed fasteners; shape and configuration as indicated on Drawings.
 - 1. Lumber Species: Hardwood lumber to match adjacent wood trim.
 - 2. Color: Transparent finish and stain to be as selected by Architect.

2.5 FINISHING

- A. Provide shop finishing for items that are shop fabricated for installation at site.
- B. Sand work smooth and set exposed nails and screws.

- C. Apply wood filler in exposed nail and screw indentations.
- D. On items to receive transparent finishes, tint wood filler to matching surrounding surfaces and of types recommended for applied finishes.
- E. Prime paint concealed wood surfaces in contact with cementitious materials.
- F. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade indicated in performance requirements and as follows:
 - 1. Refer to Section 09 90 00 - Painting and Coating for finishes for interior wood.
 - 2. Transparent System:
 - a. System - 5, Varnish, Conversion.
 - b. Stain:
 - 1) Match wood door stain.
 - 2) Semigloss.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify adequacy of backing and support framing.
- C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install work in accordance with performance requirements indicated.
- C. Set and secure materials and components in place, plumb and level.
- D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- E. Install trim with finish nails at 12 inches on center.
 - 1. Set, fill and finish over fastener locations to match surrounding finish.
- F. Install hardware.
- G. Site Applied Wood Treatment:
 - 1. Apply preservative treatment.
 - 2. Brush apply one coat of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.
 - 3. Allow preservative to dry prior to erecting members.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Indicated Position: 1/16 inch.

- C. Maximum Offset from Alignment with Abutting Materials: 1/32 inch.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.

END OF SECTION

SECTION 06 42 16
WOOD-VENEER PANELING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood veneer paneling.
 - 2. Wood trim and moldings.
- B. Related Requirements:
 - 1. Section 06 10 53 - Miscellaneous Rough Carpentry: Grounds and support framing.

1.2 : REFERENCE STANDARDS

- A. ASTM International:
 - 1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. American National Standard Institute:
 - 1. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications, 2009.
- C. Architectural Woodwork Institute:
 - 1. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2014.
- D. U.S. Department of Commerce National Institute of Standards and Technology:
 - 1. DOC PS 20 - American Softwood Lumber Standard.

1.3 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate locations and requirements for blocking and backing for support and attachment of work of this section.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
 - 1. Submit data on fire retardant treatment materials and application instructions.
- C. Shop Drawings:
 - 1. Indicate materials, surface graining elevations of sheet paneling, fastening methods, joining methods, and interruptions to other work, to minimum scale of 1-1/2 inches equals 1 foot.
 - 2. Include plan of panel number sequencing.
- D. Samples for Initial Selection: For products with factory-applied finishes, submit two manufacturer's color charts illustrating the full range of finishes, colors, and sheens available. For products receiving field-applied finishes, submit color charts illustrating a full range of finishes, colors, and sheens. Submit to Architect for initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare two samples for each selected finish and color; on same product material type indicated for final Work; each

8x10 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1.5 QUALITY ASSURANCE

- A. Paneling: In accordance with AWI AWS Section 8; Custom Grade.
- B. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.6 QUALIFICATIONS

- A. Fabricator: Company specializing in fabricating products specified in this section with minimum three (3) years documented experience.

1.7 MOCKUP

- A. Section 01 40 00 - Quality Requirements: Mockup requirements.
- B. Construct mockup, 12 feet long by 12 feet wide, illustrating full panel sheet, edge trim, and joint trim.
- C. Locate where directed by Architect.
- D. Incorporate accepted mockup as part of Work.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect work from moisture damage.
- C. Maintain storage space relative humidity within ranges indicated in AWI/AWMAC/WI (AWS) Section 2.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. During and after installation of Work of this section, maintain same temperature and humidity conditions in building spaces as will occur after occupancy.
 - 1. Maintain relative humidity within ranges indicated in AWI/AWMAC/WI (AWS) Section 2.

PART 2 PRODUCTS

2.1 WOOD VENEER PANELING

- A. Manufacturers:
 - 1. Marlite.
 - 2. Rulon.
 - 3. Western Panel Manufacturing, Inc.
 - 4. Substitutions: Section 01 60 00 - Product Requirements.

2.2 MATERIALS

- A. Flush Wood Veneer Panels: HPVA HP-1.
 - 1. Core: Medium density fiberboard.
 - 2. Thickness: 3/4 inch unless indicated otherwise on Drawings.

3. Veneer Face Grade: Select AA grade.
 4. Veneer Face Species:
 - a. Red Oak.
 5. Veneer Slicing: Rift cut.
 6. Veneer Grain Direction: Vertical.
 7. Matching of Individual Leaves to Each Other: Book matching.
 8. Matching Across Panel Face: Balanced matching.
 9. Matching or Relationship of Panels to Each Other: Premanufactured sets matching.
 10. Edge Banding: Veneer matching veneer face in species and finish.
- B. Hardwood Lumber:
1. Species:
 - a. As indicated on Drawings.
 2. Cut: Plain sawn.
- C. Lumber Moisture Content Range: 4 to 9 percent.
- D. Medium Density Fiberboard: ANSI A208.2, composed of wood fibers, medium density.
1. Fire Retardant Fiberboard: ASTM E84; 25 maximum flame spread index and 450 maximum smoke developed index.

2.3 WOOD TREATMENT

- A. Fire Retardant Treatment: Chemically treated and pressure impregnated, having flame spread of 25 or less when tested in accordance with ASTM E 84 and showing no evidence of significant progressive combustion when test is continued for an additional 20 minute period, Interior Type.
- B. Provide identification on fire retardant treated material.
- C. Product installation must conform to requirements for installation in auditorium occupancy (A - assembly) as set forth by the current Building Code for the State and Jurisdiction in which the project is located. Indicate compliance in shop drawing submittal.
- D. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.
- E. Moisture Content after Treatment: Kiln dried (KDAT).
 1. Lumber: As indicated for interior lumber.
 2. Plywood: Maximum 15 percent.

2.4 FABRICATION

- A. Fabricate to AWI/AWMAC/WI (AWS) Section 10; Custom Grade.
- B. Shop prepare and identify sheets for grain matching during site erection.
- C. Prepare panels for delivery to site, permitting passage through building openings.
- D. Fit exposed sheet material edges with matching veneer edging. Use one piece for full length only.
- E. When necessary to cut and fit on site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and site cutting.
- F. Finish exposed edges of panels as specified by grade requirements.

2.5 FINISHES

- A. Sand work smooth and set exposed fasteners.

- B. Apply wood filler in exposed nail indentations. Tint wood filler color as to result in a match to the surrounding surfaces after finishing is complete. Wood filler type to be compatible with applied finishes. Installed work shall have no visible indication of fasteners or filler.
- C. Finish work in accordance with AWI/AWMAC/WI (AWS) Section 5; Custom Grade; Stained Transparent Type:
 - 1. System 5, Conversion varnish.
 - 2. Stain Color: Custom color and sheen as selected by Architect from submitted custom samples.
- D. Seal internal surfaces and semi-concealed surfaces.

2.6 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Fasteners: ASTM A153/A153M, hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
- B. Concealed Joint Fasteners: Threaded steel.
- C. Concealed Shimming and Blocking: Lumber to be softwood or hardwood as required for application and conditions.
- D. Exposed Furring and Blocking: Lumber to be same species and finish as wood veneer panels.
- E. Wood Panel Reveal: Extruded aluminum alloy 6063 T5, 0.050 inch wall thickness.
 - 1. Configuration:
 - a. Retainer Flange Face: 3/8 inch.
 - b. Reveal Width: 1/2 inch.
 - c. Depth: As required to match panel thickness.
 - d. Joints: Mitered to tight fit and alignment.
 - 2. Finish: Clear anodized.
 - 3. Manufacturers:
 - a. Flannery - Wood Panel Reveal Trim (Basis of Design).
 - b. Fry Reglet.
 - c. Gordon.
 - d. Pittcon.
 - e. Substitutions: Section 01 60 00 - Product Requirements.
- F. Other accessories as indicated on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify field measurements prior to fabrication. Indicate field measurements on shop drawings.
- C. Verify adequacy of backing and support framing.
- D. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) Section 8; Custom Grade.
- B. Set and secure materials and components in place, plumb and level.
- C. Scribe work abutting other components with maximum and consistent gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Coordinate installation of blocking behind paneling.
- E. Coordinate installation of firestopping behind paneling.
- F. Install ceiling paneling with clips with blind fasteners at 24 inches on center.
- G. Set exposed fasteners, fill with wood filler, and finish to match panel finish.
- H. Install wall paneling with Z clips at 24 inches oc.
- I. Touch up damaged finish to match original, using materials provided by fabricator; replace components that cannot be refinished like new.
- J. Finish to be as selected by Architect from samples selected.

3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Conform to AWI/AWMAC/WI (AWS) Section 8 requirements for the following:
 - 1. Smoothness.
 - 2. Gaps.
 - 3. Flushness.
 - 4. Flatness.
 - 5. Alignment.
- C. Maximum Variation from True Position: 1/16 inch.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.

END OF SECTION

SECTION 07 11 00

DAMPPROOFING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Bituminous dampproofing.
- B. Related Requirements:
 - 1. Section 04 20 00 - Unit Masonry.

1.2 REFERENCE STANDARDS

- A. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2011).
- B. ASTM D1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013.
- C. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; Fifth Edition, with interim updates.

1.3 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide properties of primer, bitumen, and mastics.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years experience.

1.5 FIELD CONDITIONS

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Karnak Corporation: www.karnakcorp.com.
- B. Mar-Flex Systems, Inc: www.mar-flex.com/sle.
- C. W.R. Meadows, Inc: www.wrmeadows.com/sle.
- D. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 DAMPPROOFING PRODUCTS

- A. Bituminous Damproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
 - 1. Composition - Vertical Application: ASTM D1227 Type III or ASTM D1187/D1187M Type I.
 - 2. Composition - Horizontal and Low-Slope Application: ASTM D1227 Type II or III.
 - 3. VOC Content: Not more than permitted by local, State, and federal regulations.
 - 4. Applied Thickness: 1/16 inch (1.5 mm), minimum, wet film. Provide thicker wet film if recommended by damproofing manufacturer.
- B. Primers, Mastics, and Related Materials: Type as recommended by damproofing manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify existing conditions before starting work.
- C. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of damproofing system.
- D. Verify that items that penetrate surfaces to receive damproofing are securely installed.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Protect adjacent surfaces not designated to receive damproofing.
- D. Clean and prepare surfaces to receive damproofing in accordance with manufacturer's instructions.
- E. Do not apply damproofing to surfaces unacceptable to manufacturer.
- F. Apply mastic to seal penetrations, small cracks, or minor honeycomb in substrate.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install damproofing system to surfaces and locations as indicated on Drawings
- C. Perform work in accordance with NRCA ML104.
- D. Prime surfaces in accordance with manufacturer's instructions.
- E. Apply damproofing with tools or equipment as recommended by manufacturer.
- F. Apply damproofing at a temperature limited by equiviscous temperature (EVT) plus or minus 25 degrees F; do not exceed finish blowing temperature for four hours.
- G. Apply each coat of damproofing in continuous and uniform coat at a rate of 1 gal per 25 sq ft.
- H. Seal penetrations and items projecting through damproofing surface. Seal watertight with mastic compatible and recommended by damproofing manufacturer.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect work from damage.

END OF SECTION

SECTION 07 14 16

COLD FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Surface preparation.
 - 2. Application of single-component, cold-applied, liquid waterproofing membrane.
- B. Related Requirements:
 - 1. Section 03 30 00 - Cast-in-Place Concrete.
 - 2. Section 04 20 00 - Unit Masonry.
 - 3. Section 07 21 00 - Thermal Insulation.
 - 4. Section 07 62 00 - Sheet Metal Flashing And Trim - Roofing.
 - 5. Section 07 90 00 - Joint Protection.

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.
 - 2. ASTM D816 - Standard Test Methods for Rubber Cements; 2016.
 - 3. ASTM D1644 - Standard Test Methods for Nonvolatile Content of Varnishes; 2001.
 - 4. ASTM D2370 - Standard Test Method for Tensile Properties of Organic Coatings; 2016.
 - 5. ASTM D2697 - Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings; 2003.
 - 6. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures.
- B. Product Data: For each type of product. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- C. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins to adjoining waterproofing, and other termination conditions.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain waterproofing materials from a single manufacturer regularly engaged in manufacturing the product.
- B. Installer Qualifications: Installer to be experienced and have adequate number of skilled personnel who are thoroughly trained and experienced in the application of fluid applied waterproofing membranes.

- C. Regulatory Requirements: Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

1.6 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.7 MOCK-UP

- A. Section 01 40 00 - Quality Requirements: Mock-up requirements.
- B. Prior to installation of waterproofing membrane, apply waterproofing membrane to 100 sf of deck or wall to demonstrate surface preparation, crack and joint treatment, corner treatment, thickness, and to demonstrate tie-ins with adjoining construction, and other termination conditions, as well as qualities of materials and execution.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- C. Store materials in a clean, dry area in accordance with manufacturer's instructions.
- D. Store at temperatures between 40 to 70 deg F (4 to 21 deg C).
- E. Protect materials during handling and application to prevent damage or contamination.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. Product not intended for uses subject to abuse or permanent exposure to the elements.
- C. Do not apply membrane when air, material, or surface temperatures are expected to fall below 30 deg F (-1 deg C) within four hours of completed application.
- D. Do not apply membrane if rainfall is forecast or imminent within 12 hours.
- E. Do not apply waterproofing membrane to any surfaces containing frost.
- F. Consult manufacturer for applications to green concrete.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Waterproofing Membrane:
 - 1. W. R. Meadows, Inc. (Basis of Design)
 - a. Hydralastic 836 Waterproofing Membrane.
 - 2. Carlisle Coatings & Waterproofing, Inc.
 - 3. Henry Company.
 - 4. Tremco Commercial Sealants & Waterproofing.
 - 5. Substitutions: Section 01 60 00 - Product Requirements.

2.2 MATERIALS

- A. Waterproofing Membrane: Single-component, cold-applied, solvent-free, non-shrink, liquid waterproofing membrane.
 - 1. Solids Content by Weight, ASTM C1250: 98 percent.
 - 2. Tensile Strength, ASTM D412: 100 psi.
 - 3. Elongation at Break, ASTM D412: 425 percent.
 - 4. Water Vapor Transmission, ASTM E96 (Method BW): 0.10 perms.
 - 5. Shore 00 Hardness, ASTM D2240: 57.
 - 6. VOC, ASTM D2369: 36 g/L.

2.3 ACCESSORIES

- A. Joint Tape: 6 inches (150 mm) minimum width, reinforcing fabric for corners, crack, and joint treatment.
 - 1. Reinforcing Fabric HCR by W. R. Meadows, Inc. (Basis of Design)
- B. Reinforced Joint Tape for outside corners subject to backfill.
 - 1. Precon Tape by W.R. Meadows, Inc. (Basis of Design)
- C. Detailing Membrane: BEM by W. R. Meadows, Inc. (Basis of Design)
- D. Concrete Repair Materials: Meadow-Patch 5 and Meadow-Patch 20 Concrete Repair Mortars by W. R. Meadows, Inc. (Basis of Design)
- E. Waterproofing Protection Course: Perminator or Protection Course by W. R. Meadows, Inc. (Basis of Design)
- F. Rolled Matrix Drainage System: Mel-Drain by W. R. Meadows, Inc. (Basis of Design)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Examine surfaces to receive membrane. Notify architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Protect adjacent surfaces not designated to receive waterproofing.
- D. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.
- E. Do not apply waterproofing to surfaces unacceptable to manufacturer.
- F. Clean concrete surfaces so they are free of all coatings, dirt, oil, paints and any other contaminants.
- G. Patch all holes and voids and smooth out any surface misalignments.
- H. Remove and patch all concrete form ties.
- I. Treatment of Existing Cracks and All Non-Structural Joints

1. Identify and install detailing membrane in all cracks and all non-structural joints.
 2. Apply a 30 wet mil coat of the fluid applied membrane ensuring that there is a minimum of 3 inches (75 mm) of membrane extending onto the wall in all directions.
 3. Embed the non-woven reinforcing fabric over the entire area of this membrane and work in using trowel.
 4. Completely cover the glass mesh with a second coat of the fluid applied membrane at 30 wet mils while the first coat is still wet, again extending 3 inches onto the wall in all directions.
- J. Treatment of Inside & Outside Corners
1. Install detailing membrane to create a minimum 3/4 inch fillet in all inside corners.
 2. Apply a 30 wet mil coat of the fluid applied membrane ensuring that there is a minimum of 3 inches (75 mm) of membrane extending onto the wall in all directions.
 3. Embed the non-woven reinforcing fabric over the entire area of this membrane and work in using trowel.
 4. Completely cover the glass mesh with a second coat of fluid applied membrane at 30 wet mils while the first coat is still wet, again extending 3 inches onto the wall in all directions.
 5. On outside corners subject to backfilling, install reinforced joint tape in lieu of fabric joint tape following the same procedure.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Apply waterproofing membrane system in accordance with manufacturer's instructions.
- C. Gently mix membrane prior to application.
- D. Apply membrane by trowel, flat-blade squeegee, or roller, at a minimum coverage rate of 25 sf per 1 U.S. gal (2.3 m²/3.78 L), providing a thickness of 60 mils wet.
- E. If a two-coat application is required, apply second coat as soon as possible with no more than eight hours between coats providing a minimum total thickness of 60 mils wet.
- F. Frequently inspect surface area to ensure proper adhesion and consistent thickness is achieved.
- G. Work material into any fluted rib forming indentations.
- H. Provide minimum cured membrane thickness of 60 mils dry.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect membrane with application of waterproofing protection course, drainage board, or other approved material.
- C. Backfill immediately using care to avoid damaging waterproofing membrane system.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Board insulation at perimeter foundation walls.
 - a. Exception: Where Drawings indicate foamed-in-place insulation, comply with Section 07 21 19 - Foamed-In-Place Insulation.
 - 2. Batt insulation and vapor retarder in exterior framed walls, ceilings and soffits.
 - 3. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior walls.
- B. Related Requirements:
 - 1. Division 07 - Thermal and Moisture Protection: Roofing insulation requirements.
 - 2. Section 07 21 19 - Foamed-In-Place Insulation: Plastic foam insulation other than boards.
 - 3. Section 09 21 16 - Gypsum Board Assemblies: Acoustic attenuation insulation for interior construction that does not require a thermal barrier between two conditioned spaces.

1.2 REFERENCE STANDARDS

- A. ASTM International (ASTM):
 - 1. ASTM C272/C272M - Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions, 2016.
 - 2. ASTM C303 - Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation; 2010.
 - 3. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.
 - 4. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation, 2017.
 - 5. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing, 2012.
 - 6. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2014.
 - 7. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016.
 - 8. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications; 2016.
 - 9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials, 2016.
 - 10. ASTM E970 - Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source, 2014.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.
- C. South Coast Air Quality Management District (SCAQMD):
 - 1. Rule 1168 - Adhesive and Sealant Applications.

- D. Green Seal:
 - 1. GS-36 - Adhesives for Commercial Use

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

PART 2 PRODUCTS

2.1 BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Extruded polystyrene board; ASTM C578; and the following characteristics:
 - 1. Application Locations:
 - a. Foundation perimeter, except where Drawings indicate foamed-in-place insulation, comply with Section 07 21 19 - Foamed-In-Place Insulation.
 - b. Protective board for sheet waterproofing system.
 - 2. Type (ASTM C578), Minimum Compressive Strength (ASTM D1621) , Minimum R-value (ASTM C518, at 75 degrees F mean temperature), Maximum Water Asorption (ASTM C272/C271M, by volume, total immersion) are as follows:
 - a. Type IV, 25 psi, R-value 5.0 per inch, Water Absorption 0.3 percent.
 - 3. Board Thickness: 3 inches unless indicated otherwise on Drawings.
 - 4. Flame Spread Index (FSI): Class A, 25 or less, when tested as per ASTM E84.
 - 5. Smoke Developed Index (SDI): 450 or less, when tested as per ASTM E84.
 - 6. Comply with fire resistance requirements shown on the drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 - 7. Board Edges: Square.
 - 8. Board Size: 48 x 96 inch, scored at 16 inch increments.
 - 9. Manufacturers:
 - a. DiversiFoam Products - CertiFoam.
 - b. Dow Chemical - Styrofoam.
 - c. Owens Corning - Foamular XPS.
 - d. Kingspan Insulation, LLC - Green Guard XPS.

2.2 BATT INSULATION MATERIALS

- A. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit.
 - 1. Unfaced Type: ASTM C665 Type-I (unfaced); rated flame spread / smoke development of 25 / 50, or less, when tested in accordance with ASTM E84).
 - a. Application Locations: Where indicated on Drawings.
 - 2. Faced Type: ASTM C665 Type-III (faced); Class-A (FSK (foil-scrim-kraft facing)); Category-I (vapor retarder facing); rated flame spread / smoke development of 25 / 50, or less, when tested in accordance with ASTM E84.
 - a. Application Locations: Where indicated on Drawings.
 - 3. Thermal Resistance: Minimum R-value of 4.0 per inch thickness, when tested in accordance with ASTM C518 at 75 degrees F.
 - 4. Combustion Characteristics: Passes when tested in accordance with ASTM E136.
 - 5. Fungi Resistance: Passes when tested in accordance with ASTM C1338.
 - 6. Nominal Density: Minimum 2.5 pcf when tested in accordance with ASTM C303.

7. Corrosivity to Steel: Passes when tested in accordance with ASTM C665.
 8. Blanket Width: Sized to fully friction fit space between framing members.
 9. Blanket Thickness: Sized to fully friction fit cavity, but not less than 3-1/2 inches.
 10. Manufacturers:
 - a. Johns Manville.
 - b. Knauf Insulation.
 - c. Owens Corning.
 - d. Rockwool.
- B. Vapor Retarder Sheet: Polyethylene film complying with ASTM D4397.
1. Application Locations: Where indicated on Drawings.
 2. Color:
 - a. Clear.
 3. Thickness:
 - a. 6 mils (0.006 inch) (0.1524 mm).
 4. Water Vapor Permeance:
 - a. For 6 mil Sheet Thickness: 0.13 perms complying with ASTM D4397.
 5. Seam and Perimeter Tape: Polyethylene self adhering type, mesh reinforced, 2 inches (50 mm) wide, compatible with sheet material.

2.3 ACCESSORIES

- A. Aluminum Foil Tape: Bright aluminum self-adhering type, mesh reinforced, minimum 2 inches wide; as recommended by insulation manufacturer.
- B. Tape For Rigid Insulation Boards: Joint tape material to be in accordance with insulation material manufacturers' instructions.
- C. Adhesive: Type recommended by insulation manufacturer for application.
 1. Interior Adhesives: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
 2. Interior Aerosol Adhesives: Maximum volatile organic compound content in accordance with GS-36.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- C. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Board Insulation at Foundation Perimeter: (Exception: Where Drawings indicate foamed-in-place insulation, comply with Section 07 21 19 - Foamed-In-Place Insulation.)

1. Adhere strip of polyethylene sheet over control joint with double beads of adhesive each side of joint between sheets. Extend sheet full height of joint.
 2. Apply adhesive in three continuous beads per board length. Daub adhesive tight to protrusions to ensure continuity of vapor retarder and air seal.
 3. Install boards horizontally on foundation perimeter.
 - a. Place boards to maximize adhesive contact.
 - b. Install in running bond pattern.
 - c. Butt edges and ends tightly to adjacent boards and to protrusions.
 4. Extend boards over expansion joints, unbonded to foundation on one side of joint.
 5. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
 6. Where cavity exists between installed foundation insulation boards and back of masonry veneer and cavity is indicated to be grouted solid, protect cavity from intrusion of soil and/or other debris. Install grout in cleaned cavity within 48 hours of masonry veneer installation.
- B. Board Insulation as Protective Board for Sheet Waterproofing System: Install in accordance with Drawings and recommendations of manufacturers' of sheet waterproofing system and board insulation.
- C. Batt Insulation:
1. Install insulation in accordance with manufacturer's instructions.
 2. Install in exterior wall, soffit spaces, ceiling spaces and other locations indicated on Drawings without gaps or voids. Do not compress insulation.
 3. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
 4. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
 5. Faced Batt Insulation: Install with factory applied face facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.
 6. Tape insulation batts in place.
 7. Tape and seal butt ends, lapped flanges, and minor tears or cuts in membrane.
- D. Vapor Retarder Sheet:
1. Install vapor retarder sheet in accordance with manufacturer's instructions.
 2. Metal Framing: Where indicated on Drawings only and in conjunction with batt insulation installation, place vapor retarder sheet on warm side of building spaces; lap and seal vapor retarder sheet joints over face of framing members (framing members will provide solid backing to facilitate applying appropriate pressure for tape adhesion).
 3. Extend vapor retarder sheet tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape and seal in place.
 4. Tape and seal minor tears or cuts in vapor retarder sheet.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 21 19

FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes foamed-in-place insulation:
 - 1. In masonry cavity walls.
 - 2. At junctions of dissimilar wall and roof materials to achieve thermal, dampproofing and air seal.
- B. Related Requirements:
 - 1. Section 04 20 00 - Unit Masonry: Insulated cavity at masonry veneer.
 - 2. Section 07 21 00 - Thermal Insulation.
 - 3. Section 07 27 00 - Air Barriers.

1.2 REFERENCES

- A. Air Barrier Association of America (ABAA):
 - 1. ABAA - Quality Assurance Program (ABAA - QAP).
- B. American Association of Textile Chemists and Colorists (AATCC):
 - 1. AATCC 127 - Water Resistance: Hydrostatic Pressure Test, 2014.
- C. ASTM International:
 - 1. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission properties by Means of the Heat Flow Meter Apparatus; 2017.
 - 2. ASTM C1029 - Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation; 2015.
 - 3. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2014.
 - 4. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016.
 - 5. ASTM D1622/D1622M - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2014.
 - 6. ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics; 2017.
 - 7. ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics; 2015.
 - 8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017.
 - 9. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials, 2016.
 - 10. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen, 2004.
 - 11. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials, 2013.
- D. FM Global:
 - 1. FM 4880 - Approval Standard for Class 1 Insulated Steel Deck Roofs.
- E. National Fire Protection Association:

1. NFPA 286 - Approval Standard for Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings, and Exterior Wall Systems.
- F. Underwriters Laboratories Inc.:
1. UL 1040 - Fire Test of Insulated Wall Construction.
 2. UL 1715 - Fire Test of Interior Finish Material.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit product description, insulation properties, and preparation requirements.
- C. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention including around windows, and other special conditions.
- D. Manufacturer's Certificates:
 1. Certify products meet or exceed specified requirements.
 2. Provide test results from large-scale tests such as NFPA 286 (with acceptance criteria of Section 803.2), FM 4880, UL 1040 or UL 1715.
 - a. Such testing shall be related to the actual end-use configuration and be performed in the finished manufactured foam plastic assembly in the maximum thickness intended for use.

1.4 QUALITY ASSURANCE

- A. Apply label from agency approved by authority having jurisdiction to identify each foam plastic component.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.
- B. Installer: Company specializing in performing Work of this section, on projects of similar size, with minimum three (3) years documented experience and certified by manufacturer.

1.6 MOCKUP

- A. Section 01 40 00 - Quality Requirements: Requirements for mockup.
- B. Provide mockup as part of the mockup requirements for Section 04 20 00 - Unit Masonry.

1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. Temperature: Install work within range of ambient and substrate temperature, and moisture content recommended by the primary material manufacturer. Do not apply materials to a damp or wet substrate. Do not install materials when ambient temperature is lower than 50 degrees F unless manufacturer provides written approval.

- C. Field Conditions: Do not install work in snow, rain, fog, or mist. Do not install air barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the material manufacturer.
- D. Sequencing. Do not install work before the roof assembly and other construction has been sufficiently installed to prevent water infiltration into the substrate construction and building.
- E. Compatibility. Do not allow materials to come in contact with chemically incompatible materials.
- F. Ultra-violet exposure. Do not expose air barrier materials to sunlight longer than as recommended by the material manufacturer.

PART 2 PRODUCTS

2.1 FOAMED-IN-PLACE INSULATION

- A. Manufacturers:
 - 1. NCFI Polyurethanes - InsulBloc.
 - 2. Demilec LLC - Heatlok Soy 200 Plus.
 - 3. BASF - Walltite US.
 - 4. Henry Company - Permax 2.0X.
 - 5. Johns Manville - Corbond III.
 - 6. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

- A. Foamed-In-Place Insulation: Conforming to ASTM C1029, medium-density, rigid or semi-rigid, closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
 - 1. Regulatory Requirements: Conform to applicable code for flame and smoke limitations.
 - 2. Thermal Resistance: R-value of 6.7, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
 - 3. Density: 2.0 pcf, minimum, in accordance with ASTM D1622/D1622M.
 - 4. Compressive Strength: 25 psi, minimum, in accordance with ASTM D1621.
 - 5. Tensile Strength: 15 psi, minimum, in accordance with ASTM D1623.
 - 6. Water Vapor Permeance: Vapor retarder; 1.0 perm, maximum, at 1.5 inches thick when tested in accordance with ASTM E96/E96M, desiccant method.
 - 7. Air Permeance: 0.004 cfm per sq ft, maximum, @ 1.57 psf pressure differential, in accordance with ASTM E2178 .
 - 8. Closed Cell Content: 90 percent, minimum, in accordance with ASTM D6226.
 - 9. Surface Burning Characteristics: ≤ 25 Flame Spread and ≤ 450 Smoke Developed, in accordance with ASTM E84.
 - 10. Fungal Growth: None in accordance with ASTM C1338.

2.3 ACCESSORIES

- A. Primer: As recommended by insulation manufacturer.
- B. Joint Filler Foam: As recommended by insulation manufacturer.
- C. Joint Sealer: Single component polyurethane type and as recommended by foamed-in-place insulation manufacturer.
- D. Moisture Detection Paper Strips: MDP Strips.
- E. Mineral Wool: Mineral Wool Board, 4 lb per cf density.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify Work within construction spaces or crevices are complete prior to insulation application.
- C. Verify surfaces are clean, dry, and free of matter capable of inhibiting adhesion work in this section.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Prime substrate if required by manufacturer.
- D. Mask and protect adjacent surfaces from over spray or dusting.
- E. Mask areas where brick abuts concrete masonry at window and door jambs and other areas where brick abuts concrete masonry.
- F. Fill voids between masonry and structural steel and metal deck with mineral wool.
- G. Install Air Barrier Flashing at all openings and other locations as indicated on the Drawings. Lap seams one inch. Prime substrate as recommended by manufacturer.

3.3 INSTALLATION

- A. Apply work in this section in accordance with manufacturer's instructions.
- B. Apply insulation by spray method, to uniform monolithic density without voids.
- C. Apply to a cured thickness of not less than that indicated on Drawings and not greater than that indicated thickness plus 1/2 inch.
- D. Provide overlap onto air barrier materials as indicated on Drawings.
- E. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.
- F. Patch damaged areas with same foam insulation product.
- G. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Monitor quality of installation and testing.
- B. Inspection will include verification of insulation thickness and density.
- C. Where damage occurs, which violates the insulation's thermal requirements, air seal and moisture seal, repair as needed using the specified spray polyurethane material or foam repair kit material approved by the manufacturer.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Do not permit subsequent construction work to damage the installed work of this section.

- C. Protect the work of this section from damage.

END OF SECTION

SECTION 07 22 16.10

ROOF INSULATION FOR MEMBRANE ROOFING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Roof insulation system requirements.
- B. Related Requirements:
 - 1. Section 06 10 53 - Miscellaneous Rough Carpentry.
 - 2. Section 07 54 23 - Thermoplastic-Polyolefin Roofing.
 - 3. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.2 REFERENCES

- A. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures, Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM International (ASTM):
 - 1. ASTM C1177/C1177 M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
 - 2. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2019.
 - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2020.
 - 4. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
 - 5. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C; 2019.
- C. International Building Code with Modifications by the State in which project is constructed; Current Edition.
- D. Underwriters Laboratories Inc. (UL):
 - 1. UL (DIR) - Online Certifications Directory; Current Edition.
 - 2. UL (FRD) - Fire Resistance Directory; Current Edition.

1.3 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Meeting is to include coordination of requirements for roofing insulation and roofing membrane as a complete roofing system.
- C. Convene minimum one week prior to commencing work of roofing insulation and roofing membrane as a complete roofing system. Review the work requirements, application procedures, quality control, testing and inspection and production schedule.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Submittals for roofing insulation and roofing membrane are to coincide as a complete roofing system.

- C. Product Data: Provide data for all materials specified.
- D. Shop Drawings: Indicating plans for fill and tapered insulation types including fastening and adhering details for each roof area.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Single-Source Responsibility: The requirements of this Section are to be coordinated and executed by the same company as the requirements specified in Section 07 54 23 - Thermoplastic-Polyolefin Roofing as an integral part of the overall roofing system.
- B. Requirements of this Section to be provided in accordance with the International Building Code with Modifications by the State in which project is constructed.
- C. Requirements of this Section to be provided in accordance with the respective manufacturer's requirements and as a coordinated integral part of the overall roofing system.
- D. System components requiring UL certification, but are not bearing UL label at point of delivery, shall be rejected.
- E. System components that are damaged or wetted before, during, or after installation shall be removed from the job site no later than the next working day from the day such damage or moisture contamination is noted.
- F. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum five (5) years of documented experience.
- G. Installer Qualifications: Company specializing in performing the work of this Section with at least five (5) years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Materials shall be delivered in the manufacturer's original sealed and labeled shrouds and in quantities to allow continuity of application.
- C. Store materials in weather protected environment. Elevate materials minimum 4 inches above ground. Protect materials for moisture. Modify shipping shrouds and coverings as required to prevent condensation moisture contamination of materials.
- D. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.
- E. Protect foam insulation from direct exposure to sunlight and moisture.
- F. Remove damaged or deteriorated materials from the job site.
- G. Handle materials in manner as prevent damage and contamination with moisture or foreign matter.

1.7 PROJECT CONDITIONS

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. Do not install materials during precipitation or other unsuitable weather. Contractor assumes all responsibility for starting installation in the event there is a probability of precipitation occurring during application.

- C. Do not apply roofing membrane when ambient temperature is outside of the most restrictive range recommendations of the manufacturers of materials.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- F. Schedule applications so that no partially completed sections of roof are left exposed and without roofing membrane at end of workday.
- G. Prevent roofing construction materials, dust, and debris from entering the structure.

1.8 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Warranty for the requirements of this Section shall be included in and shall be an integral part of the warranty requirements indicated in Section 07 54 23 - Thermoplastic-Polyolefin Roofing.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Wind Design: Design and install the insulation system to withstand the required wind uplift pressures as specified in Section 07 54 23 - Thermoplastic-Polyolefin Roofing.

2.2 COMPONENTS

- A. Polyisocyanurate (ISO) Insulation Board: Rigid closed-cell foam panels, complying with ASTM C1289.
 - 1. Classifications:
 - a. Type II:
 - 1) Class 1 - Faced with glass fiber reinforced cellulosic felt facers on both major surfaces of core foam.
 - 2) Compressive Strength: Classes 1-2-3, Grade 3 - 25 psi (172 kPa), minimum.
 - 3) Thermal Resistance, R-value (RSI-value): At 1-1/2 inch (38.1 mm) thick; Class 1, Grades 1-2-3 - 8.4 (1.48), minimum at 75 degrees F (24 degrees C).
 - 2. Flame Spread Index (FSI): 25 to 75, tested in accordance with ASTM E84.
 - 3. Smoke Developed Index (SDI): 450 or less, tested in accordance with ASTM E84.
 - 4. Curing Time: 24 hours minimum, plus an additional 24 hours minimum per inch thickness, at a minimum of 60 degrees F before shipment from the manufacturer.
 - 5. Dimensional Stability: 2 percent maximum linear change when conditioned at 158 degrees F and 97 percent relative humidity for seven days.
 - 6. Board Size:
 - a. Maximum, 4 x 8 feet for mechanical attachment.
 - b. Maximum, 4 x 4 feet for adhered attachment.
 - c. Field cutting of larger boards is not acceptable.
 - 7. Board Thickness: As required for two (2) layers to equal total thickness indicated on Drawings.
 - a. Applied in not less than two (2) layers, with staggered and sealed joints; total insulation thickness to be as indicated on Drawings,

- b. Thickness above roof level at interior side of parapet walls to be 1 inch, unless indicated otherwise on Drawings.
- 8. Tapered Board: Slope as indicated on Drawings, but not less than 1/4 inch per foot; minimum thickness 1/2 inch.
 - a. Slope for Crickets and Saddles: 1/2 inch per foot.
- 9. Board Edges:
 - a. Square.
- 10. Manufacturers:
 - a. Atlas Roofing Corporation.
 - b. Johns Manville.
 - c. Rmax, Incorporated.
 - d. Versico Roofing Systems.
 - e. Substitutions: Section 01 60 00 - Product Requirements.
- B. Cover Boards: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 500 psi moisture resistant treated core, non-asphaltic primer surfacing, and tested in accordance with ASTM E84 and ASTM E136. Board Size shall be 4 x 8 feet and thickness shall be 5/8 inch.
 - 1. Manufacturers:
 - a. Georgia Pacific: DensDeck Prime Roof Board. (Basis of Design)
 - b. National Gypsum Company: DEXcell Glass Mat Roof Board.
 - c. USG Corporation: Securock Glass-Mat Roof Board.
 - d. Substitutions: Section 01 60 00 - Product Requirements.

2.3 ACCESSORIES

- A. Insulation Joint Tape: Minimum 6 inches wide, self-adhering, glass fiber reinforced type, compatible with roofing materials, and as recommended by insulation manufacturer.
- B. Attachment Materials: Approved by manufacturer of material to be fastened or adhered to installed substrate.
 - 1. Mechanical Fasteners: For attachment of material to installed metal decking.
 - a. Corrosion resistant 3 inch galvalume stress plate and corrosion resistant screw type fasteners.
 - b. Length, diameter, and configuration to be as required by material type, thickness, and size. Length to provide for penetration through metal deck material by minimum 3/4 inch and maximum of 1 inch.
 - 2. Adhesives: Foamed and fluid applied adhesives to be a one or two part, VOC compliant, moisture-cured polyurethane type.

PART 3 EXECUTION

3.1 GENERAL

- A. The following execution requirements are minimum requirements. Where manufacturer's requirements are more stringent, follow the manufacturer's more stringent requirements.

3.2 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Inspect substrate for soundness and compliance with project requirements and recommendations of roofing system materials manufacturers.

- C. Commencement of work signifies Contractor's acceptance of substrate. Any defects in roofing work resulting from such accepted substrates shall be corrected to Owner's satisfaction at no additional expense.

3.3 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section. Prepare materials to be installed and equipment used during installation.
- B. Roof deck to be dry and broom cleaned of debris and foreign matter prior to installation of insulation materials.

3.4 INSTALLATION

- A. Fill and Tapered Insulation.
 - 1. Comply with the requirements of this Section, the Drawings, and the instructions of the manufacturers of the insulation materials and roofing membrane.
 - 2. Apply only as much insulation materials as can be covered watertight by the roofing membrane on the same day.
 - 3. Insulation materials to be in full sheets, carefully fitted and pushed together for tight joints. Gaps exceeding 1/4 inch are not acceptable.
 - 4. Insulation materials that must be cut to fit, are to be saw-cut or knife-cut in a straight line, not broken. Chalk lines to be used to cut insulation. Uneven or broken edges are not acceptable. Insulation shall be field trimmed to fit tightly to roof obstructions and terminations.
 - 5. Remove dust and debris from roof area that develops during cutting operations.
 - 6. Stagger joints (vertically and horizontally) of each successive layer of board materials by 12 inches to ensure that joints do not coincide with joints of preceding layers.
 - 7. On steel decks, apply board materials with long dimension of units across deck ribs. Ends of board materials must be bearing on upper flute surface of steel deck for continuous end support.
 - 8. On concrete decks, prime concrete decks prior to attachment with a uniform coating of primer per manufacturer's standard application rates.
 - 9. Crickets, saddles, and tapered edge strips shall be installed before the cover board material.
 - 10. At roof edges, install insulation system, nailers and other roof construction in a manner as to produce a flush and smooth transition for roof membrane and flashing.
 - 11. Install insulation, tapered insulation and tapered edge strips as required to accommodate roof and flashing conditions, prevent water dams and ponding water. Ponding water at scuppers and cricket valleys is not acceptable.
 - 12. Provide necessary modifications to prevent standing water which is defined as 1/4 inch of water or more, in an area that is 4 sf or larger, at 24 hours or more after precipitation.
- B. Tapered Insulation
 - 1. Install tapered insulation system to achieve elevations, thicknesses and slopes indicated on Drawings and to provide positive slope for complete roof drainage.
 - 2. Crickets shall be sized as shown in the Drawings. Modifications shall be provided to ensure positive slope and prevent standing water along cricket valleys and at drain sumps.
 - a. Minimum length to width ratio shall be 2:1. Fabricate partial crickets with dimensions which would result in a minimum length to width ratio of 2:1 if they were extended to full size.

- b. Unless otherwise noted, fabricate all crickets from tapered stock as required to provide the specified minimum slope. For example, when roof slope is indicated as 1/4 inch per foot minimum, fabricate crickets with slope of 1/2 inch per foot minimum.
 - c. Construct crickets on up slope side of all curbs to ensure positive drainage.
 - d. Install tapered edge strips at cricket edges and drain sumps to provide a smooth transition to cricket valley or roof drain construction.
3. Insulation boards may require mechanical fasteners and stress plates at slope transitions to minimize bridging.
- C. Roof Drainage:
1. Drainage sumps shall be installed as detailed.
 2. Carefully lay out and install tapered insulation, sumps, drain bowls and scuppers to ensure the finished roof provides complete drainage with no standing water.
 3. Fabricate sumps to provide smooth transitions between the insulation system and the drains/scuppers.
 4. Sumps shall ensure complete roof drainage and prevent water dams.
 5. Adjust insulation, drains and scuppers to ensure complete roof drainage and satisfactory substrates for membrane and flashings.
 6. Drain sump components shall be fastened to the deck using specified insulation fasteners or adhesives.
 7. Circular sumps and sumps that do not provide smooth transition or that create standing water at the drains shall be rejected and shall require removal and replacement.
- D. Mechanical Attachment:
1. Mechanical fasteners and materials being fastened shall be installed in accordance with recommendations of manufacturers and in locations, quantities, and spacing as required to withstand Wind Design requirements indicated in this Section in QUALITY ASSURANCE article.
 2. Fasteners shall be installed using manufacturer's recommended equipment and in accordance with the manufacturer's requirements.
 3. Fasteners and stress plates shall be set secure and tight against the insulation surface and shall not be over-driven.
 4. Fasteners shall engage the top flange of steel deck.
 5. Coordinate to avoid damage to other construction components below decking (i.e. electrical conduits, box, etc.).
- E. Adhesive Attachment:
1. Adhesive and materials being adhered shall be installed in accordance with recommendations of manufacturers and in locations, quantities, and spacing as required to withstand Wind Design requirements indicated in this Section in QUALITY ASSURANCE article.
 2. Material shall be placed in full contact with adhesive and weighted into place.
 3. Ensure full adhesion of materials and provide appropriate equipment and methods necessary to achieve full adhesion, including, but not limited to, temporary ballasting until adhesive sets.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed work from damage and moisture.

END OF SECTION

SECTION 07 27 00

AIR BARRIERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes air leakage criteria for primary air seal building enclosure materials and assemblies; materials and installation methods supplementing other air seal materials and assemblies; and air seal materials to connect and seal openings, joints, and junctions between other air seal materials and assemblies.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection, 2017.
 - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials, 2017.
 - 3. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials, 2014.
 - 4. ASTM E2178 - Standard Test Method for Air Permeance of Building materials, 2013.
- B. ICC Evaluation Service, LLC (ICC-ES);
 - 1. ICC-ES AC308 - Acceptance Criteria for Water-Resistive Barriers, 2013.

1.3 DEFINITIONS

- A. Air Barrier: Continuous network of materials and joints providing air tightness, with adequate strength and stiffness to not deflect excessively under air pressure differences, to which it will be subjected in service. It can be comprised of single material or combination of materials to achieve performance requirements.

1.4 PERFORMANCE REQUIREMENTS

- A. Static Test: Resist air leakage caused by static air pressure across exterior wall assemblies and other interruptions to integrity of building enclosure systems; to maximum air leakage rate of 0.004 cfm/sq ft when subjected to pressure differential of 1.57 lb/sq ft when tested in accordance with ASTM E2178.
- B. Provide continuity of air seal materials and assemblies in conjunction with materials described in Section 07 90 00.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures
- B. Product Data: Submit data on material characteristics, performance criteria, and limitations.
- C. Manufacturer's Installation Instructions: Submit preparation, installation requirements and techniques, product storage and handling criteria.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.

- B. Maintain temperature and humidity recommended by materials manufacturers before, during and after installation.

1.7 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Evaluated Materials Program (EMP): Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacturing. Use secondary materials approved in writing by primary material manufacturer.
- B. Applicator: Company specializing in performing Work of this section with minimum three (3) years documented experience.

1.8 SEQUENCING

- A. Section 01 30 00 - Administrative Requirements: Scheduling and sequencing.
- B. Sequence Work to permit installation of materials in conjunction with related materials and seals.

1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work of this section with sections referencing this section.

PART 2 PRODUCTS

2.1 AIR BARRIER FLASHING MATERIALS (AIR BARRIER AND WATER-RESISTIVE)

- A. Air Barrier Flashing Sheet Seal:
 - 1. Type: Rubberized asphalt bonded to thermoplastic sheet, self-adhesive.
 - 2. Thickness: 40 mil (0.040 inch).
 - 3. Sheet Width: 18 inches, 24 inches, and 36 inches.
 - 4. Air Leakage: 0.004 cfm/sq ft, maximum when subjected to pressure differential of 1.57 lb/sq ft when tested in accordance with ASTM E2178.
 - 5. Water Vapor Permeance: 0.05 perm, maximum, when tested in accordance with ASTM E96/E96M.
 - 6. Water Absorption: 0.25 percent by weight, maximum, when tested in accordance with ASTM D1970/D1970M.
 - 7. Seam and Perimeter Tape: As recommended by sheet manufacturer.
 - 8. Products:
 - a. Henry Company; Blueskin SA. (Basis of Design)
 - b. Carlisle Coatings and Waterproofing, Inc; CCW-705 Air and Vapor Barrier Sheet.
 - c. W.R. Meadows, Inc; Air-Shield.

2.2 ACCESSORIES

- A. Substrate Cleaner: Non-corrosive; type recommended by barrier product manufacturer; compatible with adjacent materials.
- B. Primer: As recommended by barrier product manufacturer for substrate material.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that surfaces and conditions are ready to accept the work of this section. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section. Prepare materials to be installed and equipment used during installation.
- B. Remove loose or foreign matter that may otherwise impair adhesion of materials.
- C. Clean and prime substrate surfaces to receive barrier materials if recommended by barrier material manufacturer.

3.3 INSTALLATION

- A. Install the Work in accordance with manufacturer's recommendations and as indicated on Drawings.
- B. Air Barriers (Sheet Seal): Install continuous air tight barrier over solid surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives if and where recommended by barrier manufacturer; apply within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- D. Self-Adhesive Sheet Seal:
 - 1. Prepare substrate in manner recommended by sheet manufacturer; fill and tape joints in substrate and between dissimilar materials.
 - 2. Lap sheets shingle-fashion to shed water and seal laps air tight.
 - 3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that all material and laps are firmly adhered to substrate with no gaps or fishmouths.
 - 4. Use same material, or other material approved by sheet manufacturer for the purpose, to seal to adjacent construction and as flashing.
 - 5. At wide joints, provide extra flexible membrane allowing joint movement.
- E. Openings, Junctions and Penetrations in Sheet Seal:
 - 1. Sheet Seal at Wall/Roof Junction: Lap sheet seal onto roof air barrier material and seal. Caulk to ensure complete air seal. Position lap seal over firm bearing.
 - 2. Install sheet seal between window and door frames and adjacent wall seal materials with air barrier material. Apply sealant to ensure complete seal. Position lap seal over firm bearing.
 - 3. Install sheet seal to maintain continuity across different substrates and interface with other construction and building assemblies.
 - 4. Provide 2 inches minimum overlap of spray foam insulation over sheet seal membrane edges
 - 5. Provide 2 inches minimum overlap at sheet seal joint and apply in manner as to shed water.
 - 6. Construct all end dams at sill installations to provide continuous air barrier with window openings.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Do not leave materials exposed to weather longer than recommended by manufacturer.
- C. Do not permit adjacent work to damage work of this section.

END OF SECTION

SECTION 07 54 23

THERMOPLASTIC-POLYOLEFIN ROOFING (ADHERED)

PART 1 GENERAL

1.1 SUMMARY

- A. Work Includes:
 - 1. Install a fully adhered, thermoplastic-polyolefin (TPO) membrane and flashings to provide a permanently watertight roofing system.
- B. Related Requirements:
 - 1. Section 06 10 53 - Miscellaneous Rough Carpentry.
 - 2. Section 07 22 16.10 - Roof Insulation For Membrane Roofing.
 - 3. Section 07 62 00 - Sheet Metal Flashing and Trim.
 - 4. Division 23 - Mechanical (HVAC) for Section related to roof mounted equipment.

1.2 REFERENCES

- A. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures, Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM International (ASTM):
 - 1. ASTM D751 - Standard Test Methods for Coated Fabrics; 2019.
 - 2. ASTM D6754/D6754M - Standard Specification for Ketone Ethylene Ester Based Sheet Roofing; 2015.
 - 3. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing; 2019.
 - 4. ASTM D7635/D7635M - Standard Test Method for Measurement of Thickness of Coatings Over Fabric Reinforcement; 2018.
- C. Cool Roofs Rating Council (CRRC):
 - 1. CRRC (DIR) - Cool Roofs Rating Council Directory; Current.
 - 2. CRRC-1 - Standard; Cool Roofs Rating Council; 2017.
- D. Factory Mutual (FM):
 - 1. FM (AG) - FM Approval Guide; Current Edition.
 - 2. FMDS 1-28 - Wind Design; 2016.
- E. International Building Code with Modifications by the State in which project is constructed; Current Edition.
- F. Underwriters Laboratories Inc. (UL):
 - 1. UL (DIR) - Online Certifications Directory; Current Edition.
 - 2. UL (FRD) - Fire Resistance Directory; Current Edition.

1.3 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Meeting is to include coordination of requirements for roofing insulation and roofing membrane as a complete roofing system.
- C. Convene minimum one week prior to commencing work of roofing insulation and roofing membrane as a complete roofing system. Review the work requirements, application procedures, quality control, testing and inspection and production schedule.

- D. Attendance: Contractor Project Manager(s), Job Superintendent(s) and Job Foreperson, Owner, Architect, Roof Designer, manufacturer's technical representative, installers of related work and all other persons concerned with the installation and performance.
- E. Minimum Agenda: Organizational arrangement of Contractor's forces and personnel, and those of subcontractors, materials suppliers, and the Project Manager; channels and procedures for communication; construction schedule, including sequence of critical work; contract documents, including distribution of required copies of Contract Documents and revisions; processing of submittals; rules and regulations governing performance of the Work and procedures for safety, first aid, security, quality control, housekeeping and related matters.

1.4 SUBMITTALS

- A. Refer to Section 01 33 00 - Submittal Procedures for Submittals.
- B. Submittals for roofing insulation and roofing membrane are to coincide as a complete roofing system.
- C. Product Data: Submit complete data sheets, including characteristics on membrane materials, adhesives, seaming materials, flashing materials, and insulation.
- D. Shop Drawings: Submit complete set of shop drawings indicating all installation details required for the roofing system installation. Note all additional required materials, including joint and termination detail conditions, cants, conditions of interface with other materials. Indicate membrane layout and seam locations. Shop drawings must be sealed, signed and dated by an engineer registered in the State in which the project is located.
- E. Manufacturer's Installation Instructions:
 - 1. Include special precautions required for seaming membrane.
 - 2. If color application is required, include installation instructions.
- F. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
- G. Submit documentation of approved, tested roof system to meet the specified requirements for the following:
 - 1. Wind uplift pressures.
 - 2. UL Fire Resistance Rating.
- H. Warranty sample(s).

1.5 QUALITY ASSURANCE

- A. Single-Source Responsibility: The requirements of this Section are to be coordinated and executed by the same company as the requirements specified in Section 07 22 16.10 - Roofing Insulation for Membrane Roofing as an integral part of the overall roofing system.
- B. Manufacturer Requirements:
 - 1. Manufacturer must have written contractor/installer approval program.
 - 2. The product must have a continuous manufacturing history with the current product formulation of no less than ten (10) years in the United States of America.
 - 3. Membrane Manufacturer's Technical Representative: Monthly interim inspections and reporting; punch list inspection and report; final inspection and report. Manufacturer's technical representative to provide Owner, Architect and Roof Designer a copy of reports within four (4) days of each inspection.
- C. Manufacturer's Field Services: During construction and until substantial completion, manufacturer's representative shall perform quality assurance site visits every ten working

days to ensure materials are being properly installed and as required to obtain the specified warranty.

1. The first site visit shall be performed within the first three (3) days of operations.
 2. Notify the Architect, Roof Designer and Owner of all site visits. Submit reports of findings to the Designer and Owner within one week of inspection. Payment applications will be subject to rejection until applicable reports are received.
 3. Inspections to be performed by an employee of the selected manufacturer that is assigned full time to their technical services department. Sales personnel will not be acceptable for this function.
 4. Notify the Architect, Roof Designer and Owner of the Manufacturer's final inspections. A minimum of seven (7) days written notice is required. If required notification is not provided and the Architect, Roof Designer or Owner wish to attend, the Architect, Roof Designer and Owner may require reinspections by the Manufacturer's inspector at no additional cost to the Owner.
- D. Contractor Requirements:
1. This roofing system shall be installed only by a Contractor authorized by the membrane manufacturer prior to bid.
 2. Application of the roofing system shall be accomplished by a primary roofing Contractor, Contractor's roofing foreperson, and sufficient applicator technicians trained and approved by the manufacturer of the roofing membrane. Contractor to submit evidence of qualification from the manufacturer.
 3. Contractor of the work of this Section is to be the same as the installer of the work of Roofing Insulation, and Sheet Metal and Trim as specified in Division 07 - Thermal and Moisture Protection
- E. Upon completion of the installation an inspection shall be made by a representative of the membrane manufacturer to review the installed roof system and list all deficiencies.
- F. There shall be no deviation made from the Contract Documents or the approved submittals without prior written approval by the Architect or Owner and the membrane manufacturer.
- G. All work shall be completed by personnel trained and authorized by the membrane manufacturer.
- H. Contractor to provide manufacturer written verification indicating all seams have been probed and are watertight.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.
- C. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.
- D. Follow manufacturer's requirements for storing of membrane rolls. Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.
- E. All adhesives shall be stored at temperatures required by the manufacturer.

- F. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
- G. All materials which are determined to be damaged by the Designer, Owner's Representative or membrane manufacturer are to be removed from the job site and replaced at no cost to the Owner.

1.7 PROJECT CONDITIONS

- A. Roofing shall not be applied during precipitation. Contractor assumes all responsibility for starting installation in the event there is a probability of precipitation occurring during application.
- B. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be cleaned and heat welded before leaving the job site that day.
- C. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather.
 - 1. The existing building and its contents shall be protected against all risks.
- D. All surfaces to receive insulation, membrane or flashings shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to application.
- E. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.
- F. Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.
- G. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A protection layer of plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.
- H. Prior to and during application, all dirt, debris and dust shall be removed from surfaces, either by vacuuming, sweeping, blowing with compressed air and/or similar methods.
- I. Contaminants, such as grease, fats, oils, and solvents, shall not be allowed to come into contact with the roofing membrane.
- J. The roofing membrane shall not be installed under the following conditions without consulting the membrane manufacturer's technical department for precautionary steps:
 - 1. The roof assembly permits interior air to pressurize the membrane underside.
 - 2. Any exterior wall has 10 percent or more of the surface area comprised of opening doors or windows.
 - 3. The wall/deck intersection permits air entry into the wall flashing area.
- K. Precautions shall be taken when using membrane adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Keep lids on unused cans at all times.

1.8 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Each warranty is to expressly acknowledge that issuance is after warranty provider's final inspection of installed roofing system.
- C. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks or breaches in roofing system that allows moisture to enter the substrate below, even if visible leaks are not observed within the facility. Warranty to be non-prorated and without monetary limitation or deductibles. Warranty to include insulation, membrane, thermal barrier, roof vapor barrier, overlayment board, insulation fasteners, mastics, adhesives, metal copings and edge metal, metal flashings, flashings, sealants and base flashings. Warranties requiring the Owner's signature will not be acceptable.
 - 1. Warranty Period: Thirty (30) years from date of Final Acceptance.
- D. Installer's Warranty: Roof System Warranty to cover workmanship for all work of this Section and roof insulation components including, but not limited to, installation of roofing insulation components such as sheathing boards, vapor retarders, insulation boards, cover boards, roofing membrane, flashings, metal work, roofing accessories and attachment construction.
 - 1. Warranty Period: Five (5) years from date of Final Acceptance.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Roofing system to meet or exceed the following:
 - 1. Roof Covering External Fire Resistance Classification: UL 790 Class A.
 - 2. Factory Mutual Classification: Class 1 and windstorm resistance of 1-90.
- B. Wind Design:
 - 1. Install roofing system to meet or exceed the requirements of the current adopted version of ASCE-7, and State Building Code in the State in which the project is located. Refer to Structural Drawings for design loads for this project.

2.2 MEMBRANE MATERIALS

- A. Manufacturers:
 - 1. GAF Corporation - EverGuard Extreme TPO. (Basis of Design)
 - 2. Carlisle SynTec Systems - Sure-Weld TPO.
 - 3. Firestone Building Products - Ultraply TPO Platinum.
 - 4. GenFlex Roofing Systems - TPO Plus System.
 - 5. Johns Manville - JM TPO.
 - 6. Manufacturer of Insulation and Cover Boards: Same manufacturer as roof membrane.
 - 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Roof Membrane: Thermoplastic-polyolefin (TPO) membrane complying with ASTM D6878; polyester reinforcement and factory applied fleece backing.
 - 1. UL listed and FM approved.
 - 2. Thickness Total: 80 mil, measured in accordance with ASTM D751.
 - 3. Thickness Above Reinforcing Fabric: Minimum 39 percent of total thickness, measured in accordance with ASTM D7635/D7635M.
 - 4. Color: White.
 - 5. Solar Reflectance Index (SRI): Minimum of 95 SRI initial value; minimum 83 SRI three-year aged value.
 - a. Values as tested and listed by CRRC (DIR).

- b. Field applied coating cannot be used to achieve specified SRI.
- C. Flashing:
 - 1. Reinforced 80 mil thick, TPO membrane for walls and curbs.
 - 2. Unsupported 80 mil. thick, TPO membrane shall be supplied for field fabricated vent stacks, pipes, drains and corners.
 - 3. Manufacturer: GAF EverGuard Extreme TPO. (Basis of Design)
- D. Fully-Adhered Low-Profile Expansion Joint: Provide flat, vulcanized waterproofing joint integral with the waterproofing membrane to accommodate movements up to: ± 1 inch, capable of 500 percent elongation at - 40 degrees F across its length and at all vulcanized points. All details and connections to be factory fabricated by means of vulcanization for one-piece installation.

2.3 RELATED MATERIALS

- A. Adhesive: Shall be membrane manufacturer's solvent based reactivating-type.
- B. T-joint Patch: Shall be membrane manufacturer's circular patch welded over T-joints formed by overlapping thick membranes.
- C. Corner Flashing: Shall be membrane manufacturer's pre-formed inside and outside flashing corners that are heat-welded to membrane or polymer clad metal base flashings.
- D. Termination Bar: Shall be manufacturer's 1/8 inch by 1 inch, mill finish, extruded aluminum bar with pre-punched slotted holes.
- E. Sealant: Shall be manufacturer's multi-purpose sealant.
- F. Fasteners:
 - 1. Concrete and Masonry Flashing Membrane Termination Anchors:
 - a. 1/4 inch diameter metal based expansion anchor with stainless steel pin of length required to penetrate substrate a minimum of 1-1/2 inches.
 - b. Masonry screws to be approved by membrane manufacturer, 1/4 inch minimum diameter, corrosion resistant, with Phillips flat head. Length required to provide minimum 1.5 inches embedment into substrate.
 - 2. Solid Concrete Deck Fasteners and Plates: Shall be nail-in, non-threaded fasteners with split bulb tip designed for securement of membrane and insulation to structural concrete roof decks, length required to penetrate deck a minimum of 1 inch with plates as approved by roof membrane manufacturer.
- G. Primary Membrane Cleaner: Shall be a high quality solvent cleaner provided by membrane manufacturer and approved by Designer for use as a general membrane cleaner.
- H. Pre-weld Cleaner: Shall be a high quality solvent based seam cleaner with moderate evaporation rate provided by membrane manufacturer.
- I. Walkway Pad: Shall be walkway pad by membrane manufacturer. Color shall differ from the roofing membrane sheet.
- J. Polymer Clad Metal: Refer to Section 07 62 00 - Sheet Metal Flashing and Trim.

PART 3 EXECUTION

3.1 SUBSTRATE PREPARATION

- A. Verify that the substrate is dry, clean, smooth, and free of loose material, oil, grease, or other foreign matter. Sharp ridges and other projections and accumulations of bitumen shall be removed to ensure a smooth surface before roofing.

- B. Any deteriorated substrate shall be repaired.
- C. Beginning installation means acceptance of prepared substrate.
- D. Provide necessary protection from adhesive vapors to prevent interaction with foamed plastic insulation.

3.2 MEMBRANE INSTALLATION

- A. Installation to be in compliance with the manufacturer's requirements and as indicated in this Section.
- B. The surface of the insulation or substrate shall be inspected prior to installation of the roof membrane. The substrate shall be clean, dry, free from debris and smooth with no surface roughness or contamination. Broken, delaminated, wet or damaged insulation boards shall be removed and replaced.
- C. Position membrane over the properly installed and prepared substrate.
- D. Fold membrane back lengthwise so half the underside of the membrane is exposed.
- E. Adhesive shall be applied using solvent-resistant 3/4 inch nap paint rollers. The adhesive shall be applied to the substrate and back side of the membrane at a rate according to the membrane manufacturer's requirements. The adhesive shall be applied in smooth, even coatings with no gaps, globs, puddles or similar inconsistencies. Allow the adhesive to dry until it is tacky but will string or stick to a dry finger touch.
 - 1. The Applicator shall count the amount of pails of adhesive used per area per day to verify conformance to the specified adhesive rate.
 - 2. No adhesive shall be applied in seam areas. All membrane shall be applied in the same manner.
- F. Roll the adhesive coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded section of the membrane immediately after rolling the membrane into the adhesive with a soft bristle broom to achieve maximum contact.
- G. Fold back the unbounded half of the sheet lengthwise and repeat the bonding procedures. This process is repeated throughout the roof area.
- H. Position adjoining sheets to allow a minimum overlap of 2 inches and hot-air weld.
- I. Weld membrane cover strips at all feltback membrane seams without a factory selvage edge.
- J. Terminate membrane at all walls as shown in the contract drawings.
 - 1. Concrete/Masonry Substrate: Membrane shall be turned up wall one inch and mechanically terminated using approved anchors eight inches on center with a termination bar.
- K. Terminate membrane at all penetrations as shown in the contract drawings.
 - 1. Membrane shall be terminated six inches on center or a minimum of four fasteners per penetration into the structural deck using fasteners and plates as approved by the membrane manufacturer for the deck substrate.
- L. Membrane shall extend over roof edge a minimum of 2 inches below the perimeter wood blocking. If fleece-back membrane is utilized, trim membrane flush with outside edge of roof and hot-air weld a non-fleece back flashing membrane to extend over the roof edge.

3.3 FLASHING INSTALLATION

- A. General
 - 1. All flashings shall be installed concurrently with the roof membrane as the job progresses.

2. No temporary flashings shall be allowed without the prior written approval of the Designer and Manufacturer. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Contractor's expense.
 3. Seams shall not be "taped" as temporary measure but shall be fully completed before the end of each day.
 4. Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces.
 5. Where substrates are incompatible with adhesives and thermoplastic materials, the Contractor shall remove the incompatible materials and replace them with a compatible substrate, or install compatible thermoplastic flashing materials.
 6. Use caution to ensure adhesive fumes are not drawn into the building.
- B. Adhesive for Flashing Membrane
1. Over the properly installed and prepared flashing substrate, flashing adhesive shall be applied according to instructions found on the Product Data Sheet. The membrane adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies.
 2. Only an area which can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.
 3. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels required by welding techniques.
- C. All flashings shall mechanically terminated at a minimum of 8 inches above the finished roofing surface using approved fasteners and counterflashing bar unless otherwise indicated in the Contract Drawings. Flashing heights less than 8 inches shall be accepted in writing by the Manufacturer's Technical Department.
- D. All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. No bitumen shall be in contact with the (roof) membrane.
- E. All flashings shall be hot-air welded at their joints and at their connections with the (roof) membrane.
- F. All flashings that exceed 30 inches (0.75 m) in height shall receive additional securement. Consult Manufacturer's Technical Department for securement methods.
- G. Corners shall be flashed using the membrane manufacturer's pre-formed corners.
- H. Polymer Clad sheet metal incorporated into the roofing system shall be sealed off with a heat welded stripping ply. The stripping ply shall extend four inches beyond sheet metal onto roof membrane and fit closely to fit closely to edge of sheet metal.
- I. Soil Pipe/Pipe Penetration:
1. Provide field wrapped pipe penetration flashing.
 2. Apply aluminum tape to penetration if asphalt contamination is present.
 3. Extend existing pipe to obtain a minimum 8 inches finished flashing height.
 4. Cut existing pipe to obtain a maximum 12 inches finished flashing height.
 5. Horizontal flashing membrane shall be hot-air welded a minimum of four inches onto the membrane.
 6. Vertical flashing membrane shall be fully adhered to pipe penetration and extend a minimum of 1.5 inches horizontal at the base of penetration. Hot-air weld vertical flashing membrane to horizontal flashing membrane.
 7. Install stainless steel draw band and sealant or hot-air weld flashing cap to terminate top edge of pipe flashing.

3.4 HOT-AIR WELDING OF SEAM OVERLAPS

- A. General
 - 1. All seams shall be hot-air welded. Seam overlaps should be 3 inches (75 mm) wide when automatic machine-welding and 4 inches (100 mm) wide when hand-welding, except for certain details.
 - 2. Welding equipment shall be provided by or approved by the membrane manufacturer. All mechanics intending to use the equipment shall have successfully completed a training course provided by a membrane manufacturer's technical representative prior to welding.
 - 3. All membrane to be welded shall be clean and dry.
- B. Hand-Welding
 - 1. Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.
 - 2. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.
 - 3. The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller is positioned perpendicular to the nozzle and pressed lightly. For straight seams, the 1-1/2 inches (40 mm) wide nozzle is recommended for use. For corners and compound connections, the 3/4 inch (20 mm) wide nozzle shall be used.
- C. Machine Welding
 - 1. Machine welded seams are achieved by the use of automatic welding equipment. When using this equipment, instructions from the manufacturer shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated off the generator.
 - 2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.
- D. Quality Control of Welded Seams
 - 1. The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark grey material from the underside of the top membrane. On-site evaluation of welded seams shall be made daily by the Applicator to locations as directed by the Designer or membrane manufacturer's representative. One inch (25 mm) wide cross-section samples of welded seams shall be taken at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Applicator at no extra cost to the Owner.
- E. Provide cut edge sealant over all cut edges of reinforced membrane after seam probing has been completed.
- F. Install T-joint patch at all T-seam locations.

3.5 WALKWAY PAD INSTALLATION

- A. Install walkway pads where shown on Drawings and at all roof access ladders, hatches, stairs, and doors with pathways leading to and around all mechanical equipment.
- B. Roofing membrane to receive walkway pad shall be clean and dry.
- C. Place chalk lines on deck sheet to indicate location of Walkway.

- D. Apply a continuous coat of membrane adhesive to the deck sheet and the back of walkway pad in accordance with membrane Manufacturer's technical requirements and press walkway pad into place with a water-filled, foam-covered lawn roller.
- E. Clean the deck membrane in areas to be welded. Hot-air weld the entire perimeter of the walkway to the roofing membrane.
- F. Check all welds with a rounded screwdriver. Re-weld any inconsistencies.
- G. Check all existing membrane seams that are to be covered by walkway with rounded screwdriver and re-weld any inconsistencies before walkway installation.

3.6 TEMPORARY CUT-OFF

- A. All flashings shall be installed concurrently, with the membrane in order to maintain a watertight condition as the work progresses.
- B. When a break in the day's work occurs in the central area of the project install a temporary watertight seal. An 8 inches strip of flashing membrane shall be welded 4 inches to the new field membrane. The remaining 4 inches of flashing membrane shall be sealed to the deck and/or the substrate so that water will not be allowed to travel under the new or existing membrane. The edge of the membrane shall be sealed in a continuous heavy application of pourable sealer of 6 inches width. When work resumes, the contaminated membrane shall be removed and disposed of. None of these materials shall be reused in the new work.
- C. If inclement weather occurs while a temporary water stop is in place, the Contractor shall provide the labor necessary to monitor the situation to maintain a watertight condition.
- D. If any water is allowed to enter under the newly-completed system, the affected area shall be removed and replaced at the Contractor's expense.

3.7 MANUFACTURER'S FIELD SERVICES

- A. Section 01 40 00 - Quality Requirements: Manufacturers' field services.
- B. Refer to QUALITY ASSURANCE article in Part 1 of this Section for requirements.

3.8 CLEANING AND PROTECTION

- A. The Contractor shall be responsible for protecting the roof from construction related damages during the Work.
- B. The Contractor shall ensure trash and debris is removed from the roof daily.
- C. Metal scraps, nails, screws and other sharp damaging debris shall be kept off of the roof membrane surface during construction.
- D. The Contractor shall clean off/remove excess adhesive, sealant, stains and residue on the membrane and flashing surfaces.
- E. The Contractor shall repair or remove and replace damaged membrane, flashings and other membrane components. Repairs shall be in accordance with the membrane manufacturers repair instruction to comply with the specified warranty.
- F. The Contractor shall remove temporary coverings and masking protection from adjacent work areas upon completion. Remove construction debris from the project site on a planned and regular basis.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fabrication and installation of sheet metal flashings and trim to provide a permanently watertight condition. Items include:
 - a. Coping Caps.
 - b. Roof Edge.
 - c. Flashings.
 - d. Counterflashings.
 - e. Counterflashing Receivers.
 - f. Fascia.
 - g. Through Wall Scupper with exterior Escutcheon.
 - h. Other items as indicated on Drawings.
 - 2. Sealants for joints within sheet metal fabrications.
 - 3. Precast concrete splash pads.
- B. Related Requirements:
 - 1. Section 04 20 00 - Unit Masonry: Metal flashings embedded in masonry.
 - 2. Section 06 10 53 - Miscellaneous Rough Carpentry.
 - 3. Section 07 22 16 - Roof Insulation.
 - 4. Section 07 54 23 - Thermoplastic-Polyolefin Roofing.
 - 5. Section 07 71 23 - Manufactured Gutters and Downspouts.
 - 6. Section 07 90 00 - Joint Protection: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.3 REFERENCE STANDARDS

- A. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
 - 2. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.
 - 3. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
 - 4. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
- B. American National Standards Institute (ANSI); Single Ply Roofing Industry (SPRI); Factory Mutual (FM):
 - 1. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems.

- C. ASTM International (ASTM):
 - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
 - 2. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
 - 3. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
 - 4. ASTM B101 - Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction; 2012.
 - 5. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
 - 6. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
 - 7. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction; 2012.
 - 8. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products; 2014.
 - 9. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
 - 10. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.
 - 11. ASTM D1005 - Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers; 1995.
 - 12. ASTM D1654 - Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments; 2008.
 - 13. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a.
 - 14. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates; 2016.
 - 15. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films; 2007.
 - 16. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007 (Reapproved 2012).
 - 17. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).
 - 18. ASTM D7091 - Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals; 2013.
- D. National Roofing Contractors Association (NRCA):
 - 1. NRCA Roofing and Water Proofing Manual, 5th Edition, 2001.
- E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
 - 1. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section and in conjunction with roofing pre-installation meeting.

1.5 SUBMITTALS

- A. See Section 01 33 00 - Submittal procedures.
- B. Product Data: Submit product data for all materials specified certifying material complies with all specified requirements.

- C. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Samples of Fabrications: Fabricate and submit one sample of each of the following illustrating configuration, dimensions, finishes, joinery, bends, corners, fasteners, seals, concealed surfaces finish and include material to be used as separator for contact with dissimilar construction materials.
 - 1. Coping Cap.
 - 2. Roof Edge.
 - 3. Counterflashing and Counterflashing Receiver assembled.
 - 4. Fascia..
 - 5. Exposed Fasteners.
 - 6. Through Wall Scupper with exterior Escutcheon.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in sheet metal work with ten (10) years of documented experience.
- B. Contractor Qualifications: Company specializing in sheet metal work with ten (10) years of documented experience.
- C. Contractor of the work of this Section is to be the same as the installer of the work of Section 07 54 23 - Thermoplastic-Polyolefin Roofing

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Store material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage. Ensure materials remain dry, covered and not in contact with the ground.
- C. Prevent contact with materials that could cause discoloration or staining. Protect stored materials from damage and contamination with moisture or foreign matter.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. Protect building and its components from the elements at all times during the project.

1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

- C. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.
- D. Coordinate all phases of work to allow continuity of work without delays.

1.10 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Factory Applied Metal Finishes Warranty:
 - 1. Provide manufacturer's twenty (20) year finish warranty in which manufacturer agrees to repair finish or replace metal that shows evidence of deterioration of factory applied finish within specified warranty period.
 - 2. Deterioration includes, but is not limited to:
 - a. Color fading in excess of 5 delta E Hunter color units in accordance with ASTM D2244.
 - b. Peeling, checking, or cracking of coating adhesion to metal.
 - c. Chalking in excess of a No. 8 in accordance with ASTM D4214, Method A.
 - d. Corrosion of substrate in excess of a No. 6 on cut edges and a No. 8 on field surfaces, when measured per ASTM D1654.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Factory Mutual approved for wind uplift protection.
- C. Wind Design Standard: Manufacture and install copings and roof edge flashing systems tested as compliant with ANSI/SPRI/FM 4435/ES-1 requirements and capable of resisting the following design pressure:
 - 1. Design Pressure: As indicated on Drawings.
- D. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
 - 1. Maintain one copy of each document on site.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 MANUFACTURERS

- A. Sheet Metal Flashing and Trim Manufacturers:
 - 1. Architectural Products Company.
 - 2. Heckmann Building Products, Inc.
 - 3. Merchant and Evans.
 - 4. Metal-Era, Inc.
 - 5. OMG Roofing Products.
 - 6. PAC-CLAD; Petersen Aluminum Corporation.

7. Perimeter Systems; a division of SAF.
8. SAF, Southern Aluminum Finishing Co.
9. Substitutions: Section 01 60 00 - Product Requirements.

2.3 METAL SHEET MATERIALS

- A. Base Metal Thickness Table: Metal thickness minimum to be as indicated in the following table unless indicated otherwise on Drawings. Face dimensions indicated apply to the largest dimensional face of a linear or formed metal fabrication and includes the outward angled drip edge.

Face Dimension	Galvanized Steel	Aluminum	Stainless Steel
Up to 4 in. (to 100 mm)	24 ga. (0.028 in.) (0.7 mm)	0.032 in. (0.82 mm)	26 ga. (0.016 in.) (0.4 mm)
> 4 in. - 8 in. (> 100 - 200 mm)	24 ga. * (0.028 in.) (0.7 mm)	0.040 in. * (1.0 mm)	26 ga. * (0.016 in.) (0.4 mm)
> 8 in. - 10 in. (> 200 - 250 mm)	22 ga. ** (0.034 in.) (0.9 mm)	0.050 in. ** (1.3 mm)	24 ga. ** (0.023 in.) (0.6 mm)
> 10 in.-16 in. (> 250 - 400 mm)	20 ga. (0.040 in.) (1.0 mm)	0.063 in. (1.6 mm)	22ga. (0.029 in.) (0.7 mm)
> 16 in. - 24 in. (> 406 mm - 610 mm)	20 ga. (0.040 in.) (1.0 mm)	0.063 in. (1.6 mm)	22ga. (0.029 in.) (0.7 mm)

Key Notes: Minimum thickness for the following components; thicker depending on face dimension:
 * Minimum thickness for Roof Edge, Fascia, and Cleats.
 ** Minimum thickness for Coping Caps.

- B. Aluminum Sheet (Pre-Finished): ASTM B209 (ASTM B209M), 3003 or 3005 alloy, H12 or H14 temper with factory applied pre-finish coating system as follows:
1. High Performance Organic Coating System: AAMA 2604, shop applied multiple coat, thermally cured polyvinylidene fluoride (PVDF) resin system.
 - a. Two-Coat Fluoropolymer: AAMA 2604, fluoropolymer finish containing not less than 50 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coatings.
 - 1) Dry Film Minimum Thickness: ASTM D7091.
 - a) Primer Coat: 0.20 to 0.40 mil.
 - b) Color Coat: 1.00 to 1.70 mil.
 - c) Total Thickness: 1.20 to 1.90 mils.
 - b. Surface: Smooth.
 - c. Color: As selected by Architect for manufacturer's full range.
 - d. Gloss: As selected by Architect for manufacturer's full range.
 - e. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
- C. Stainless Steel: ASTM A666, Type 304 alloy, soft temper.
1. Finish:
 - a. No. 4 - Brushed finish.
- D. Protective Film: Factory apply a strippable plastic film to material surfaces to protect the finish during fabrication, shipping, handling, and installation.

2.4 POLYMER CLAD METAL

- A. Polymer Clad Metal - Metal flashings and trim manufactured with roofing membrane laminated cladding; heat-weldable cladding for watertight seal to roofing membrane; 25 mil thick cladding membrane coating to match the flashing membrane composition laminated on

one side. Polymer-clad metal to be manufactured by, and included in the warranty of, the roofing membrane manufacturer. Color as selected by Architect.

- B. Polymer clad metal type to be that which is indicated for flashing and trim components.
- C. Metal flashings and trim components to be fabricated with polymer clad metal include the following:
 - 1. Items indicated on Drawings.

2.5 COPING CAPS

- A. Manufactured system in section lengths not less than 10 feet (12 feet preferred); concealed anchorage; with corner units, end cap units, and concealed splice plates. All exposed components to match in material and finish.
 - 1. Pre-finished aluminum sheet; sloped top at 1/2 inch per foot.
 - 2. Configuration: As indicated on Drawings.
 - 3. Corners Units: Factory mitered.
 - a. Continuously welded. Apply specified finish after fabrication.
 - 4. Joint splice plate; material and finish to match coping cap; 6 inches wide minimum; factory applied neoprene sealant strip each edge to maintain waterproof assembly.
 - 5. Face-Leg Cleats: Continuous each side; spring action linear support at mid-span of coping cap sloped top.
 - 6. Surface: Smooth.
 - 7. Color: As selected by Architect from full range of options.

2.6 ROOF EDGE FASCIA

- A. Manufactured system in section lengths not less than 10 feet (12 feet preferred); concealed anchorage; with corner units, and concealed splice plates. All exposed components to match in material and finish.
 - 1. Pre-finished aluminum sheet.
 - 2. Configuration: As indicated on Drawings.
 - 3. Corners Units: Factory mitered.
 - a. Continuously welded. Apply specified finish after fabrication.
 - 4. Joint splice plate; 6 inches wide minimum; factory applied neoprene sealant strip each edge to maintain waterproof assembly.
 - 5. Face-Leg Cleats: Continuous.
 - 6. Surface: Smooth.
 - 7. Color: As selected by Architect from full range of options.

2.7 THROUGH WALL SCUPPERS

- A. Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch-wide wall flanges to interior, and base extending 6 inches beyond cant or tapered strip into field of roof. Continuous weld all joints. Fabricate from the following materials:
 - 1. Material: Aluminum; ASTM B209 (ASTM B209M), 3003 or 3005 alloy, H12 or H14 temper.
 - 2. When indicated on Drawings, fabricate scupper sleeve with polymer clad metal for watertight bond to roofing membrane and flashing.
 - 3. Exterior Escutcheon: Required where no downspout conductor head is indicated for drainage. Fabricate unit; without seams; profile and configuration as indicated on Drawings; pre-finished aluminum and finish as specified in this Section; metal to be 0.050 inch thick metal with hemmed edges; color as selected by Architect from full range of options.

2.8 FABRICATION

- A. Fabrication General Requirements: Except where indicated otherwise on Drawings, fabrications are to comply with the following requirements.
- B. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- C. Fabricate cleats of same material as fabricated sheet materials. Cleat thickness, width, and profile to be capable of withstanding loads and stresses required for securement and interlocking with fabricated sheet materials.
- D. Form pieces in longest possible lengths.
- E. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- F. Fabricate corners from one piece with minimum 24 inch long legs.
 - 1. Seam for rigidity, seal with sealant.
 - 2. Factory prefabricate corners with mitered and factory welded joints prior to application of factory applied finish.
- G. Fabricate vertical faces with bottom edge formed outward 1/2 inch and hemmed to form drip.

2.9 ACCESSORIES

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other accessories as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of materials to which application is made, unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design and wind loads and recommended by manufacturer of components being fastened. Exposed fasteners to be finish with matching finish system of material being fastened.
 - 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. Provide metal-backed EPDM waterproof sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
- C. Fasteners for securing components to treated lumber and/or plywood shall be stainless steel, or specifically manufactured with published approvals for treated lumber applications.
- D. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- E. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- F. Anchors: As required by application condition.
 - 1. Lead Anchors: Minimum 1/4 inch diameter lead anchor.
 - 2. Sleeve-Type or Wedge-Type based on application, minimum 5/8 inch diameter, Type 304 or 316 Stainless, Expansion Anchor Bolt Assembly. Follow fastener manufacturer's published guidelines for substrate type and condition:
- G. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2-inch wide and 1/8 inch thick.
- H. Sealant primers: Primers to be manufactured by or approved by the sealant manufacturer. Primer types required for substrate and sealant as published by sealant manufacturer.

- I. Elastomeric Sealant: For exposed joints: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight. Color to match adjacent material or
- J. Butyl Sealant: For concealed joints: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- K. Plastic Cement: ASTM D4586/D4586M, Type I.
- L. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D1187/D1187M.
- M. Underlayment Materials:
 - 1. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
 - 2. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.
- N. Primer:
 - 1. Aluminum and Stainless Steel: Zinc chromate primer.
 - 2. Galvanized Steel: Zinc chromate or galvanized iron primer.
- O. Reglets (Receivers): Type and configuration as indicated on Drawings. Material and finish to match metal flashing component to be secured into reglet. Material thickness to be as required by referenced standards but not less than 0.050 inch..
- P. Solder: ASTM B32; Sn50 (50/50) type.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that substrates, surfaces, and conditions are ready to accept the work of this Section.
- C. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- D. Verify roofing termination and base flashings are in place, sealed, and secure.
- E. Verify that field measurements are as required.
- F. Examine products to be installed for damage and other conditions detrimental to completion of the Work.
- G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Install starter and edge strips, and cleats before starting installation.
- D. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.

- E. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Comply with Drawings and referenced standards.
- C. Installation shall comply with the sheet metal system and component Manufacturer's published installation manuals and guidelines and all referenced standards therein.
- D. Installation of sheet metal flashings incorporated into roofing system shall meet all minimum requirements published by the membrane Manufacturer in addition to all requirements specified and detailed herein.
- E. Coping and trim sections shall expand and contract freely while mechanically locked in place on anchor cleats.
- F. Coping and trim sections shall lock to anchor cleats by mechanical pressure from support chairs.
- G. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
 - a. Install to seal watertight all rough carpentry, parapet walls, curbs, and roof transitions before installing sheet metal flashing.
 - b. The underlayment shall be left in place, not cut, or removed, before installing sheet metal flashing.
 - c. Cover underlayment with slip sheet for separation from metal work to be installed.
- H. Insert flashings into reglets to form tight fit; secure in place with lead or plastic wedges; seal flashings into reglets with sealant.
- I. Secure flashings in place using concealed fasteners and use exposed fasteners only where permitted by Architect.
- J. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.
- K. Apply plastic cement compound between metal flashings and felt flashings.
- L. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- M. Seal metal joints watertight.

3.4 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for quality control of work and installation.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.5 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures.
- B. Clean installed work in accordance with manufacturer's recommendations including cleaning procedures and materials.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed construction from damage.

END OF SECTION

SECTION 07 71 23

MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Gutters.
 - 2. Downspouts.
 - 3. Downspout Boots.
 - 4. Conductor Heads (Collection Boxes).
 - 5. Supports and Accessories.
- B. Related Requirements:
 - 1. Section 07 22 16.10 - Roof Insulation for Membrane Roofing.
 - 2. Section 07 54 23 - Thermoplastic-Polyolefin Roofing (Adhered).
 - 3. Section 07 62 00 - Sheet Metal Flashing and Trim.
 - 4. Section 07 90 00 - Joint Protection.

1.2 REFERENCES

- A. American Architectural Manufacturers Association:
 - 1. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- B. ASTM International:
 - 1. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003, reapproved 2016.
 - 2. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar, 2015.
 - 3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate, 2014.
- C. Sheet Metal and Air Conditioning Contractors:
 - 1. SMACNA (ASMM) - Architectural Sheet Metal Manual, 7th Edition, 2012.

1.3 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
 - 1. Coordinate Work with construction related to or interfacing with this Work.
 - 2. Coordinate Work with downspout discharge pipe inlet.

1.4 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section and in conjunction with roofing pre-installation meeting.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, sizing, spacing, slope, calculations, and installation details.
- C. Product Data: Submit data on manufactured components, materials, and finishes.

- D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
 - 1. Submit a gutter section and downspout section of minimum size 12 inches long illustrating actual metal, thickness, configuration, profile, color, and texture.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with these specifications and SMACNA (ASMM) - Architectural Sheet Metal Manual.
- B. Installation shall comply with the current NRCA Roofing and Water Proofing Manual, 5th Edition, 2001, where applicable.
- C. Installation shall comply with the sheet metal system and component manufacturers' published installation manuals and guidelines and all referenced standards therein.
- D. Work to be free of leaks in all weather conditions.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years documented experience.
- B. Installer: Company specializing in sheet metal work with minimum five (5) years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver materials in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.
- C. Store materials within areas designated or approved by the Owner. Ensure materials remain dry, covered and not in contact with the ground.
- D. Handle material in such manner as to preclude damage and contamination with moisture or foreign matter.

1.9 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Provide the pre-finished sheet metal manufacturer's thirty (30) year finish warranty from the date of substantial completion.

PART 2 PRODUCTS

2.1 PRE-FINISHED ALUMINUM

- A. ASTM B209 Aluminum Alloy Sheet and Plate, alloy and temper 3003-H14.
 - 1. Thickness: 0.040 inch (40-mil), unless indicated otherwise on Drawings or in this Section.
 - 2. Finish: Primed and finished on one side with fluoropolymer coating; multiple coats to minimum 1.0 mil total dry film thickness as specified for sheet metal system, thermally cured, conforming to AAMA 2604. On reverse side, finish with wash coat

compatible with finish system as recommended by finish system manufacturer; wash coat to minimum 0.3 to 0.4 mil dry film thickness. A strippable plastic film should protect the finish during fabrication and installation.

- a. Color: As selected by Architect from full range of colors and sheens.

2.2 COMPONENTS

- A. Gutters:
 1. Pre-Finished Aluminum; 0.050 inch thick; profile as indicated on Drawings.
- B. Downspouts:
 1. Pre-Finished Aluminum; 0.040 inch thick; profile as indicated on Drawings.
- C. Downspout Boots: Cast iron; smooth interior without boxed corners or choke points; include integral lug slots, integral cleanout, cleanout cover, and tamper proof fasteners.
 1. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
 2. Basis of Design: J.R. Hoe and Sons.
 3. Configuration and Profile:
 - a. As indicated on Drawings.
 4. Finish: Manufacturer's standard factory applied powder coat finish.
 - a. Color:
 - 1) To be selected by Architect from full range of colors and sheen.
 5. Accessories: Compatible with and appropriate for installation of downspout boots.
 - a. Stainless steel fasteners and building wall anchors.
 - b. Neoprene gaskets and rubber coupling.
- D. Conductor Heads (Collection Boxes):
 1. Pre-Finished Aluminum; 0.050 inch thick; profile as indicated on Drawings.
 2. Pre-manufactured conductor heads to fit scupper drainage outlets and downspouts.
 3. Factory welded joints.
 4. Factory apply finish after fabrication.

2.3 ACCESSORIES

- A. Anchors and Supports: Profiled to suit gutters and downspouts.
 1. Anchoring Devices: In accordance with SMACNA requirements.
 2. Gutter Supports:
 - a. Brackets - Configuration, size and metal thickness as indicated on Drawings. Finish to match gutter.
 3. Downspout Supports:
 - a. Straps, minimum 0.050 inch thick. Finish to match downspout.
- B. Fasteners: Same material and finish as gutters and downspouts.

2.4 FABRICATION

- A. Form components of the Work to sizes and profiles indicated on Drawings.
- B. Form component in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- C. Hem exposed edges of metal.
- D. Seal joints watertight.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Contractor is to coordinate all work for correct sequencing of items which make up the completed building envelope systems.
- C. Verify that surfaces are ready to receive work.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to minimum dry film thickness of 15 mil.
- D. Protect components to prevent scratches, dents and other damages during the work and associated with the work of other trades.
- E. Verify that all exposed fasteners are pre-finished to match surface finish of the component being fastened.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install products in accordance with manufacturer's instructions.
- C. Sheet Metal: Join lengths with seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- D. Slope gutters 1/8 inch per foot minimum to drains.
- E. Connect downspouts to downspout boots at elevations indicated on Drawings; but, in no case is connection to be less than 4 inches above grade. Do not seal connection watertight.

3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean installed work and comply with manufacturer's recommendations.
- C. Clean adjacent soiled surfaces and comply with surface manufacturer's recommendations.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed construction from damage.

END OF SECTION

SECTION 07 72 33

ROOF HATCHES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes prefabricated roof hatches, with integral support frames and curbs, operable hardware, counter flashing, and related components.
- B. Related Requirements:
 - 1. Sections related to roof decking and topping construction.
 - 2. Section 06 10 53 - Miscellaneous Rough Carpentry.
 - 3. Division 07 - Thermal and Moisture Protection: Roofing, sheet metal flashing and trim, roof insulation, and accessories.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on unit construction, sizes, configuration, jointing methods, and locations when applicable, and attachment method.
- C. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selections.
- D. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- E. Manufacturer's Installation Instructions: Indicate special installation criteria and interface with adjacent components.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Installed assemblies to withstand 40 lbf/sq ft external live load with a maximum deflection of 1/150 of the span and negative (uplift) design pressure of 20 lbf/sq ft or greater.

2.2 ROOF HATCHES

- A. Manufacturers:
 - 1. Babcock-Davis Hatchways.
 - 2. Bilco.
 - 3. Dur-Red.
 - 4. J.L. Industries.
 - 5. Milcor.
 - 6. O'Keeffe's Inc.
 - 7. Substitutions: Section 01 60 00 - Product Requirements.
- B. Description: Factory-assembled and finished; metal curb, frame, and cover, complete with operating hardware and safety components; weather sealed construction and installation.
 - 1. Style: Provide flat metal covers unless otherwise indicated.

2. Mounting Substrate: Frames and curbs suitable for mounting to roof structure and substrate deck type indicated on Drawings for each hatch location.
3. Size: Unless indicated otherwise on Drawings, provide the following:
 - a. For Ladder Access: Single leaf; 30 by 36 inches.
 - b. For Ships Ladder Access:
 - 1) Single leaf; 36 by 60 inches.
 - c. For Stair Access: Single leaf; 30 by 96 inches.
 - d. For Equipment Access: Double leaf; 48 by 48 inches.
- C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; configure extended bottom flange to suit mounting requirements and roof angle.
 1. 3 inches thick, metal double wall insulated construction.
 2. Top frame opening rim height to be level and minimum 12 inches above finish roofing surface.
- D. Metal Covers: Perimeter flush with frame and double wall insulated metal construction.
 1. 3 inches thick, metal double wall insulated construction.
 2. Gasket: Neoprene, continuous around cover perimeter.
- E. Metal Material:
 1. Aluminum: 3003 alloy, H14 Temper, 11 gauge (0.0907 inch) thick, minimum.
- F. Insulation Material: Mineral wool, cavity filled and with no voids.
- G. Factory Finish:
 1. Aluminum:
 - a. Factory mill finish.
- H. Hardware: Manufacturer's standard finish.
 1. Compression spring operator and shock absorbers.
 2. Steel manual pull handle for interior operation.
 3. Steel hold open arm with vinyl covered grip handle for easy release.
 4. Padlock hasp.
 5. Hinges: Manufacturer's recommended type for specific type of roof hatch.
- I. Safety Guard Railing: Fiberglass pipe or tube fabrication, minimum 1-1/2 inches outside diameter posts, top rails, and intermediate rails; 42 inches overall height above roof surface; self-latching hinged gate protecting hatch access side.
 1. Guard Openings: Maximum 21 inches.
 2. Mounting Hardware: Corrosion resistant type for secure attachment to hatch frame without penetrating roof membrane and without inhibiting hatch cover operation.
 3. Gate Hardware: Corrosion resistant hinges and latching mechanism.
 4. Fasteners: Stainless steel.
- J. Safety Post: Telescoping type with positive safety lock.

2.3 ACCESSORIES

- A. Anchorage Devices: Type recommended by curb manufacturer.
 1. Stainless steel materials if exposed to weather.
- B. Blocking and Brackets: Type recommended by curb manufacturer.
 1. Stainless steel materials if exposed to weather.
- C. Counterflashings: Same metal type and finish as roof hatch frame.
- D. Protective Coating: Coating to maintain separation between dissimilar metals.
 1. Zinc molybdate alkyd.

- E. Sealant: Manufacturer's recommended sealants integral with roof hatch installation, nonhardening, non-skinning, nondrying, nonmigrating butyl based sealants.

2.4 FABRICATION

- A. Fabricate components free of visual distortion and free of defects. Weld corners and joints.
- B. Sloped Roofs: Fabricate roof hatch curbs tapered to maintain hatch top level to horizontal.
- C. Provide for condensation occurring within components and within assembly to drain to exterior above roofing.
- D. Fit components for weather tight assembly.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify openings and substrate conditions are ready to receive Work of this section.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Apply protective coating on aluminum surfaces of roof hatches to be in contact with cementitious materials or dissimilar metals.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install insulated curb assembly, fastening securely to roof decking. Flash curb assembly into roof system.
- C. Place and secure roof hatch frame and curb assembly. Install integral setting sealant and counterflashing as required.
- D. Installation to be watertight assembly.
- E. Coordinate with installation of roofing system and related flashings for weather tight installation.
- F. Apply protective coating on surfaces of components in contact with cementitious materials or dissimilar metals.
- G. Adjust operational components for smooth operation.

3.4 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Test for proper operation.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

- B. Remove excess sealant.
- C. Clean surfaces and components in accordance with manufacturer's recommendation.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.

3.7 DEMONSTRATION AND TRAINING

- A. Section 01 79 00 - Demonstration and Training: Provide demonstration and training to the Owner regarding operation and maintenance of installed Work.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Firestopping through-penetrations of fire rated assemblies.
 - 2. Firestopping joints in fire rated assemblies.
 - 3. Firestopping tops of fire rated walls.
 - 4. Smoke sealing at joints between floor slabs and exterior walls.
 - 5. Smoke sealing penetrations and joints of smoke partitions.
- B. Related Requirements:
 - 1. Section 04 05 03 - Masonry Mortaring and Grouting: Mortar used for firestopping.
 - 2. Section 09 21 16 - Gypsum Board Assemblies: Gypsum board fireproofing.
 - 3. Division 22: Plumbing work requiring firestopping.
 - 4. Division 23: HVAC work requiring firestopping.
 - 5. Division 26: Electrical work requiring firestopping.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
 - 4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
- B. Intertek Testing Services (Warnock Hersey Listed):
 - 1. WH - Certification Listings.
- C. Underwriters Laboratories Inc.:
 - 1. UL - Fire Resistance Directory.
 - 2. UL 263 - Fire Tests of Building Construction and Materials.
 - 3. UL 1479 - Fire Tests of Through-Penetration Firestops.
 - 4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
- D. California Department of Health Services (CA/DHS):
 - 1. CA/DHS/EHLB/R-174 - Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

1.3 DEFINITIONS

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 PERFORMANCE REQUIREMENTS

- A. Conform to UL or WH for fire resistance ratings and surface burning characteristics.

- B. Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on product characteristics, performance, and limitation criteria.
- C. Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- D. Manufacturer's Installation Instructions: Submit preparation and installation instructions.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- F. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.6 QUALITY ASSURANCE

- A. All firestopping on the project to be performed by the same Company.
- B. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
 - 1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.
 - 2. Floor Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
 - a. Floor Penetrations Within Wall Cavities: T-Rating is not required.
- C. Through Penetration Firestopping of Non-Fire Rated Floor Assemblies: Materials to resist free passage of flame and products of combustion.
 - 1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
 - 2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.
- D. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.
 - 1. Smoke Barrier Joints Air Leakage: Maximum 5 cfm per foot 0.30 inches water gage pressure differential
- E. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.
- F. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three (3) years documented experience and approved by manufacturer.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. Do not apply materials when temperature of substrate material and ambient air is below 60 degrees F.
- C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of materials.
- D. Provide ventilation in areas to receive solvent cured materials.

PART 2 PRODUCTS

2.1 FIRESTOPPING

- A. Manufacturers:
 - 1. A/D Fire Protection Systems, Inc.
 - 2. Hilti Corp.
 - 3. 3M Fire Protection Products
 - 4. Nelson Firestop Products
 - 5. Specified Technologies
 - 6. United States Gypsum Co.
 - 7. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
 - 1. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
 - a. Maximum volatile organic compound content in accordance with CA/DHS.
 - 2. Fiber Stuffing and Sealant Firestopping: Composite of mineral fiber stuffing insulation with silicone elastomer for smoke stopping.
 - a. Maximum volatile organic compound content in accordance with CA/DHS.
 - 3. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
 - 4. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
 - a. Maximum volatile organic compound content in accordance with CA/DHS.
 - 5. Firestop Pillows: Formed mineral fiber pillows.

2.2 ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
 - 1. Maximum volatile organic compound content in accordance with CA/DHS.
- B. Dam Material: Permanent; mineral fiber matting.
- C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.
- D. Remove incompatible materials affecting bond.
- E. Install damming materials to arrest liquid material leakage.

3.3 APPLICATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit, and other items, requiring firestopping.
- C. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
- D. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.
- E. Compress fibered material to maximum 40 percent of its uncompressed size.
- F. Install fire-rated cable management/firestopping products at locations as indicated on the Drawings or any location where low-voltage cable penetrates a fire rated partition.
- G. Dam material to remain.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Monitor quality of installation, inspection, and testing.
- B. Inspect installed firestopping for compliance with specifications and submitted schedule.
- C. Install descriptive label at all penetrations including UL assembly and verify noted UL assembly is consistent with installation

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean adjacent surfaces of firestopping materials.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 90 00
JOINT PROTECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes sealants and joint backing, and accessories.
- B. Related Sections:
 - 1. Section 07 84 00 - Firestopping: Firestopping sealants.
 - 2. Section 08 80 00 - Glazing: Glazing sealants and accessories.
 - 3. Section 09 21 16 - Gypsum Board Assemblies: Acoustic sealant.
 - 4. Section 09 30 00 - Tiling: Sealant used as tile grout.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.
 - 2. ASTM C719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle); 2014, with amendments 2019.
 - 3. ASTM C834 - Standard Specification for Latex Sealants; 2017.
 - 4. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
 - 5. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
 - 6. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension; 2016.
 - 7. ASTM D1056 - Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber; 2014.
- B. California Department of Health Services:
 - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

1.3 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with sections referencing this section.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Products Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C. Samples for Initial Selection: Submit two (2) sets of samples of manufacturer's full range of colors and finishes for each joint protection product indicated for Architect's initial selection.
 - 1. Exterior Wall Applications: Provide for custom color selection by Architect.
- D. Samples for Verification: Acquire Architect's direction to provide one of the following from Architect's initial selection:
 - 1. Submit two samples, 6 inches long, illustrating profile, dimension, color, and finish.

2. Install Mockup samples of three (3) different shades of each sealant at each variation of construction type to be sealed for Architect to make selection verifications. Mockup locations to be as directed by Architect.
 - a. This Mockup requirement is for sealants that will remain visible and without paint or coating.
- E. Manufacturer's Installation Instructions: Submit special procedures, surface preparation, and perimeter conditions requiring special attention.
- F. Indoor Air Quality Certificates:
 1. Certify volatile organic compound content for each interior sealant and related primer.
- G. Warranty Sample: As specified in this section.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.

1.6 PROJECT CONDITIONS

- A. Section 01 60 00 - Product Requirements.
- B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

1.7 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds.
- B. Provide 20 year manufacturer's weatherseal and non-staining warranty.
- C. Warranty: Include coverage for replacement of installed sealant and accessories for adhesion and cohesion failure, degradation of sealant, failure of sealant to cure, failure to maintain watertight seal, and staining of substrate.

PART 2 PRODUCTS

2.1 JOINT SEALERS

- A. Silicone Sealant: ASTM C920, Grade NS, Class 25; single component, neutral curing, non-sagging, non-staining, fungus resistant, non-bleeding.
 1. Manufacturers:
 - a. Dow Chemical Company (Basis of Design).
 - b. General Electric Company, Silicone Products Division
 - c. Pecora Corporation.
 2. Color: Colors as selected by Architect from full range.
 3. Movement Capability: Plus and minus 25 percent.
 4. Service Temperature Range: -65 to 180 degrees F.
 5. Shore A Hardness Range: 15 to 35.
- B. Acrylic Sealant: ASTM C920, Grade NS, Class 12-1/2; single component, solvent curing, non-staining, non-bleeding, non-sagging.
 1. Manufacturers:
 - a. BASF, Sonneborn (Basis of Design).
 - b. Pecora Corporation.

- c. Sika Corporation.
 - d. Tremco.
 2. Color: White.
 3. Movement Capability: Plus and minus 12-1/2 percent.
 4. Service Temperature Range: -13 to 180 degrees F.
 5. Shore A Hardness Range: 25 to 50.
 6. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- C. Self-Leveling Silicone Sealant: ASTM C920, Grade P, Class 25; single component, chemical curing, non-staining, non-bleeding, self-leveling type.
 1. Color: Gray.
 2. Movement Capability: Plus and minus 25 percent.
 3. Service Temperature Range: -40 to 180 degrees F.
 4. Shore A Hardness Range: 20 to 35.
- D. Polyurethane Sealant: ASTM C920; polyurethane based, non-sag elastomeric sealant; Grade NS, Uses M and A; single or multi-component; paintable.
 1. Manufacturers:
 - a. Sika Corporation (Basis of Design).
 - b. BASF, Sonneborn.
 - c. Pecora Corporation.
 - d. Substitutions: Section 01 60 00 - Product Requirements.
 2. Color: To be selected by Architect from full range.
 3. Movement Capability: Plus and minus 35 percent, minimum; ASTM C719.
 4. Service Temperature Range: Minus 40 to 170 degrees F.
 5. Shore A Hardness Range: 20 to 45; ASTM C661.
 6. Tensile Stress: 125 - 175 psi at 21 days; ASTM D412.
 7. Elongation to Break: 550 percent, minimum; ASTM D412

2.2 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D1056, sponge or expanded rubber; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify substrate surfaces and joint openings are ready to receive work.
- C. Verify joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section. Prepare materials to be installed and equipment used during installation.
- B. Remove loose materials and foreign matter impairing adhesion of sealant.
- C. Clean and prime joints.
- D. Perform preparation in accordance with ASTM C1193.
- E. Protect elements surrounding Work of this section from damage or disfiguration.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.

3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean adjacent soiled surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect sealants until cured.

3.6 SCHEDULE

- A. Exterior Joints for Which No Other Sealant Type is Indicated: Silicone - DOWSIL 795.
- B. Control and Expansion Joints in Paving: Silicone - Self Leveling.
- C. Control, Expansion, and Soft Joints in Masonry, and Between Masonry and Adjacent Work: Silicone - DOWSIL 790.
- D. Lap Joints in Exterior Sheet Metal Work: Silicone - DOWSIL 795.
- E. Joints Between Exterior Metal Frames and Adjacent Work (except masonry): Silicone - DOWSIL 795.
- F. Interior Joints at Vertical and Underside of Concrete Panels and Planks: Polyurethane type.
- G. Under Exterior Door Thresholds: Clear silicone - DOWSIL 999A.
- H. Interior Joints for Which No Other Sealant is Indicated: Acrylic - BASF, Sonneborn Sololac.

- I. Control and Expansion Joints in Interior Concrete Slabs and Floors: Silicone - Self Leveling.
- J. Joints Between Plumbing Fixtures and Walls and Floors, and Between Counter tops and Walls: White silicone - sanitary type.

END OF SECTION

SECTION 07 95 00

EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes expansion joint cover assemblies for floor, wall and ceiling surfaces.
- B. Related Requirements:
 - 1. Section 04 20 00 - Unit Masonry: Execution requirements for placement of joint assembly frames specified in this section in masonry.
 - 2. : Section 07 90 00 - Joint Protection: Expansion and control joint finishing utilizing sealant and bond breaker.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes, 2014.
 - 2. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric), 2013.
 - 3. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles, 2010.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Product Data: Submit joint assembly profiles, profile dimensions, anchorage devices, and manufacturer's full range and custom range of colors and finishes.
- C. Shop Drawings: Indicate joint and splice locations, miters, layout of work, affected adjacent construction, and anchorage locations.
- D. Samples for Initial Selection: Submit two samples of manufacturer's full range of colors and finishes for Architect's initial selection.
 - 1. For Exterior Wall Applications: Allow for custom color selection by Architect.
- E. Samples for Verification: Submit two samples 6 inches long, illustrating profile, dimension, color, and finish selected from Architect's initial selection.
 - 1. For Exterior Wall Applications: Allow for custom color selection by Architect.
- F. Manufacturer's Installation Instructions: Submit rough-in sizes; provide templates for cast-in or placed frames or anchors; required tolerances for item placement.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Expansion Joint Cover Assemblies:
 - 1. MM Systems Corporation. (Basis of Design)
 - 2. Architectural Art Mfg., Inc.
 - 3. Balco, Inc.
 - 4. BASF Watson Bowman Acme Corporation.
 - 5. Construction Specialties, Inc.

6. Nystrom, Inc.

2.2 : APPLICATIONS

- A. Colors to be as selected by Architect from submitted samples, unless indicated otherwise.
- B. Interior Joints:
 1. Floor to Floor Joints: Flushline System FSS Series.
 2. Wall to Wall Masonry Joints: ESS Series.
 3. Wall to Wall Masonry Corner Joints: ESS Series.
 4. Wall to GWB Ceiling Joints: VSGL Series.
 5. Wall to Acoustic Ceiling Joints: VSGL Series.
 6. Inline Acoustic Ceiling Joints: VSG Series.
- C. Exterior Joints:
 1. Wall to Wall Masonry Joints - Exterior: ESS Series.

2.3 EXPANSION JOINT COVER ASSEMBLIES

- A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
 1. Joint Dimensions and Configurations: As indicated on Drawings.
 2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
 3. Joint Cover Styles: As indicated in the Applications Article of this section and as indicated on Drawings.
 4. Joint Movement Capability: If not indicated, provide minimum plus/minus 50 percent joint movement capability.
 5. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
 6. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.
- B. Floor Joint Covers: Coordinate with indicated floor coverings.
 1. If floor covering is not indicated, obtain instructions from Architect before proceeding.
 2. If style is not indicated, provide extruded aluminum frame both sides, resilient seals, and minimize exposed metal.
- C. Sliding Cover Plate Type Covers: Provide plate with beveled edges and neat fit that does not collect dirt.
- D. Covers In Fire Rated Assemblies: Provide cover assembly having fire rating equivalent to that of assembly into which it is installed.
 1. Acceptable Evaluation Agencies: UL, ULC, and Intertek.

2.4 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.
 1. Colors: As selected by Architect from submitted samples.
- B. : : : Anchors and Fasteners:
 1. Exterior Applications: Stainless steel as recommended by cover manufacturer.
 2. Interior Applications at Cementitious Substrates: Stainless steel as recommended by cover manufacturer.
 3. Interior Applications at Non-Cementitious Substrates: As recommended by cover manufacturer.

- C. Backing Paint: Asphaltic type.
- D. Sealant: Silicone, color to match preformed expansion joint color.

2.5 FABRICATION

- A. Joint Covers: Aluminum cover plate, designed to permit plus or minus 50 percent joint movement with full recovery, surface mounted.
- B. Back paint components in contact with cementitious materials or dissimilar metals.
- C. Shop assemble components and package with anchors and fittings.
- D. Furnish joint components in single continuous length wherever practical. Minimize site splicing.

2.6 FACTORY FINISHING

- A. As selected by Architect from submitted samples.

PART 3 : : EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Examine substrates for conditions detrimental to installation of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.
- D. Verify that joint sealant system has been installed before application of rigid joint cover assembly.
- E. Verify that frames and anchors installed by others are in correct locations and suitable for installation of remainder of assembly.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Provide anchoring devices for installation and embedding.
- D. Provide templates and rough-in measurements.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install components and accessories in accordance with manufacturer's instructions.
- C. Align materials and cover assemblies as indicated on the Drawings.
- D. Align work plumb and level, flush with adjacent surfaces.
- E. Rigidly anchor to substrate to prevent misalignment.
- F. Where indicated, apply field sealant to exterior joint material, both sides of joint.

3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.
- B. Clean installed work in accordance with manufacturer's recommended materials and procedures.

3.5 PROTECTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Do not permit traffic over unprotected floor joint surfaces.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Non-fire-rated hollow metal doors and frames.
 - 2. Fire-rated hollow metal doors and frames.
 - 3. Hollow metal frames for wood doors and door types other than steel doors.
 - 4. Hollow metal borrowed lites glazing frames.
- B. Related Requirements:
 - 1. Section 04 20 00 - Unit Masonry: Wall construction type. Masonry grout fill of metal frames and placement of anchors into masonry wall construction.
 - 2. Section 08 14 16 - Flush Wood Doors: Wood doors for metal frames.
 - 3. Section 08 71 00 - Door Hardware: Hardware, silencers, and weatherstripping.
 - 4. Section 08 80 00 - Glazing: Glass for doors and lite frames.
 - 5. Section 09 21 16 - Gypsum Board Assemblies: Wall construction type.
 - 6. Section 09 90 00 - Painting and Coating: Field painting.

1.2 REFERENCES

- A. American National Standards Institute (ANSI) and Steel Door Institute (SDI):
 - 1. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
 - 2. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2003 (R2009).
 - 3. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames; 2014.
 - 4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- B. Americans With Disabilities Act (ADA):
 - 1. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.
- C. ASTM International (ASTM):
 - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2011.
 - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- D. International Code Council (ICC):
 - 1. ICC A117.1 - Accessible and Usable Buildings and Facilities.
- E. Intertek Testing Services (ITS):
 - 1. ITS (DIR) - Directory of Listed Products; current edition.
- F. National Fire Protection Association (NFPA):
 - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
 - 2. NFPA 101 - Life Safety Code.
 - 3. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and other Opening Protectives; 2019.

4. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.
 5. NFPA 257 - Standard On Fire Test For Window And Glass Block Assemblies; 2017.
- G. Steel Door Institute (SDI):
1. SDI 117 - Tolerances, 2013.
- H. Underwriters Laboratories Inc.:
1. UL (Dir) - Online Certifications Directory; current edition.
 2. UL 9 - Standard for Fire Tests of Window Assemblies.
 3. UL 10B - Fire Tests of Door Assemblies.
 4. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
 5. UL 1784 - Air Leakage Tests of Door Assemblies.

1.3 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene at project site minimum one week prior to commencing work of this section.
- C. Require attendance of Architect, Owner, Owner's Locksmith and installers of doors, frames, hardware, access control systems, electrical and walls.
- D. Review specification section and cited standards for this Work and Work of related installers; verify submittal approvals and outstanding issues; verify qualifications including qualifications of Contractor's inspectors.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit manufacturer's product data describing products and components. Include sample of each warranty specified.
- C. Shop Drawings: Indicate materials and details of design and construction; hardware locations; reinforcement type and locations; anchor types, spacing, locations and fastening methods; door and frame elevations and assemblies; glazing; fire rating; smoke and draft control; and finishes.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
- B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this section with at least five (5) years documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three (3) years documented experience.
- D. Maintain at project site copies of reference standards relating to installation of products specified.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept frames and doors on site in manufacturer's packaging. Inspect for damage.
- C. Comply with manufacturer's recommendation and ANSI/SDI A250.8 in accordance with specified requirements.
- D. Protect with resilient packaging; prevent against humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate fire rating of metal frames to fire rating requirements of doors and wall construction compliance with overall fire rated separation requirements.
- C. Coordinate Work with frame and door opening construction and door hardware and glazing installation.
- D. Coordinate frames to accommodate various glazing types, door types and hardware requirements as indicated in the Drawings and other specification sections.
- E. Coordinate door frames and anchors with adjacent wall construction which may include, but not be limited to, masonry and framed wall construction with various finish types.
- F. Coordinate fabrication of doors and frames to include factory installed steel plate reinforcing for required hardware devices as indicated in this Section and in Section 08 71 00 for each door and frame. Reinforcing to comply with ANSI/SDI A250.8 and ANSI/SDI A250.6.
- G. Coordinate fabrications and sequence installation to accommodate required door hardware electric wire connections.

1.8 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Furnish manufacturer's five (5) year warranty for fire rated and for smoke and draft control assemblies.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door - Assa Abloy.
 - 2. Curries - Assa Abloy.
 - 3. Fleming Door Products - Allegion.
 - 4. Pioneer Industries.
 - 5. Republic Doors - Allegion.
 - 6. Steelcraft - Allegion.
 - 7. Substitutions: Section 01 60 00 - Product Requirements.

2.2 REGULATORY REQUIREMENTS

- A. Regulatory requirements in this Article are minimum requirements, unless requirements by authorities having jurisdiction are more stringent. Comply with the most stringent requirements.
- B. Fire Rated Assemblies:
 - 1. Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated.
 - 2. Fire Rating: As indicated on Drawings, tested in accordance with UL 10C and NFPA 252 (positive pressure fire tests).
 - 3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - a. Attach fire rating label to each fire rated unit.
 - 4. Temperature-Rise Rating (TRR) Across Door Thickness: In accordance with local building code and authorities having jurisdiction.
- C. Smoke and Draft Control Assemblies:
 - 1. Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Locations as indicated on Drawings.
 - 3. Self-closing or automatic closing doors in accordance with NFPA 80 and NFPA 105, with fire-resistance-rated wall construction rated the same or greater than the fire rated doors, and the following;
 - 4. Maximum Air Leakage: 3.0 cfm/sq ft (0.02 cu m/sec/sq m) of door opening at 0.10 inch w.g. (24.9 Pa) pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.
 - 5. Gasketing: Provide gasketing and edge sealing as necessary to achieve leakage limit.
 - 6. Label: Include the "S" label on fire-rating label of door.
- D. Fire Rated, Borrowed-Lite Assemblies:
 - 1. Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire protection ratings.
 - 2. Fire Rating: As indicated on Drawings, tested in accordance with UL 9 and NFPA 257.
- E. Accessibility: Comply with ICC A117.1 and ADA Standards.

2.3 HOLLOW METAL DOORS AND FRAMES

- A. Standard and custom shop fabricated hollow metal doors and frames; fire rated and smoke and draft control assemblies; refer to Drawings and this Section for sizes and configurations.
- B. Finish for doors and frames:
 - 1. Factory primed and field finished. Refer to 09 90 00 - Coating and Painting for field finish.
- C. Interior Doors: ANSI/SDI A250.8, 1-3/4 inch thick.
 - 1. Level 3 - Extra Heavy Duty; door face 0.053 inch (16 gauge) thick steel, minimum.
 - 2. Model 2 (seamless), unless indicated otherwise on Drawings.
 - 3. Level A Physical Performance; 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
 - 4. Door Face Sheet: Flush.
 - 5. Door Core:
 - a. Manufacturer's standard core material/construction and in compliance with requirements.
 - 6. End Closures: Steel channel type; 0.042 inch thick; flush with door faces and edges.

7. Fire-Rating and Smoke and Draft Control: As indicated on Drawings and in compliance with REGULATORY REQUIREMENTS in this Section.
- D. Interior Frames: ANSI/SDI A250.8.
1. Level 3 - Extra Heavy Duty; 0.053 inch (16 gauge) thick steel, minimum.
 2. Joinery of Frame Members:
 - a. Full profile continuously welded type.
 3. Fire-Rating and Smoke and Draft Control: As indicated on Drawings and in compliance with REGULATORY REQUIREMENTS in this Section.
- E. Exterior Doors: ANSI/SDI A250.8, 1-3/4 inch thick.
1. Level 4 - Maximum Duty; door face 0.067 inch (14 gauge) thick steel, minimum.
 - a. Zinc Coating: A60/ZF180 (galvannealed), ASTM A653/A653M.
 2. Model 2 (seamless), unless indicated otherwise on Drawings.
 3. Level A Physical Performance; 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
 4. Door Face Sheet: Flush.
 5. Door Core:
 - a. Manufacturer's standard core material/construction and in compliance with requirements.
 6. Thermal Resistance Rating: For doors and frames separating conditioned air space and unconditioned air space, provide door and frame assembly with R-value of not less than 2.4 deg F x h x sq. ft./BTU when tested in accordance with ASTM C1363.
 7. End Closures: Steel channel type; 0.042 inch thick; flush with door faces and edges.
 - a. Provide weep hole openings in bottoms to permit moisture to escape to exterior. Seal joints in top edges of doors against water penetration.
 8. Weatherstripping: Refer to Section 08 71 00.
 9. Fire-Rating and Smoke and Draft Control: As indicated on Drawings and in compliance with REGULATORY REQUIREMENTS in this Section.
- F. Exterior Frames: ANSI/SDI A250.8.
1. Level 4 - Maximum Duty; 0.067 inch (14 gauge) thick steel, minimum.
 - a. Zinc Coating: A60/ZF180 (galvannealed), ASTM A653/A653M.
 2. Joinery of Frame Members:
 - a. Full profile continuously welded type.
 3. Weatherstripping: Refer to Section 08 71 00.
 4. Fire-Rating and Smoke and Draft Control: As indicated on Drawings and in compliance with REGULATORY REQUIREMENTS in this Section.
- G. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on Drawings. Non-removable stops on non-secured side of frame.

2.4 ACCESSORIES

- A. Louvers: Roll formed steel with overlapping frame; steel coating and finish same as door components; factory-installed.
1. In Fire-Rated Doors: UL (DIR) or ITS (DIR) listed fusible link louver, same rating as door.
 2. Style: Standard straight slat blade, unless indicated otherwise on Drawings.
 3. Louver Free Area: Comply with air flow requirements.
 4. Fasteners: Concealed fasteners.
- B. Glazing: As specified in Section 08 80 00 - Glazing; factory installed.
- C. Removable Glazing Stops: Rolled steel channel shape, mitered or butted corners; prepared for countersink type screw holes and screws.

- D. Frame Anchors:
 - 1. Masonry Walls: Masonry strap type; three holes in strap; galvanized.
 - 2. Metal Stud Walls: Steel stud channel type.
 - 3. Base Anchor: Fixed base type.
- E. Astragals for Double Doors: Comply with requirements of door operation and fire rating and smoke and draft control.
- F. Hollow Metal Fixed Panels: If indicated on Drawings, provide panels of same construction, performance, and finish as doors.
- G. Silencers: Specified in Section 08 71 00.
- H. Weatherstripping: Specified in Section 08 71 00.

2.5 FABRICATION

- A. Fabricate doors and frames to comply with fire rating and smoke and draft control indicated on Drawings.
- B. Fabricate doors and frames with hardware reinforcement welded in place. Comply with ANSI/SDI A250.8 and ANSI/SDI A250.6. Protect frame hardware preparations with mortar guard boxes.
- C. Fabricate frames to accommodate various glazing types, door types and hardware requirements as indicated in the Drawings and other specification sections.
- D. Fabricate frames and anchors to suit indicated adjacent wall and floor construction which may include, but not be limited to, concrete, masonry and framed wall construction with indicated finish types.
- E. Fabricate frames to suit masonry wall coursing with head member height as required to fill opening without cutting masonry units.
- F. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
- G. Prepare interior frames for silencers or other seal devices for achieving fire rating and smoke and draft control requirements.
- H. Kerfed Frames: Provide kerfed-style frames where required by door seal hardware such as smoke gasketing, sound gasketing or weatherstripping.
- I. Frame Silencers and Weatherstripping:
 - 1. Interior Frames: Prepare frames for silencers. Provide three single silencers for single doors on strike side. Provide two single silencers on frame head at double doors without mullions.
 - 2. Exterior Frames: Configure exterior frames with profile to receive recessed weatherstripping.
- J. Frame Mullions for Double Doors: Removable type, with profile matching jambs.
- K. Frame Transom Bars for Glazed Lights: Fixed type, integral with adjacent frame construction and with profile matching jamb and head.
- L. Attach fire rating label to each fire rated door and frame.
- M. Attach label to each hollow metal door and frame indicating A-60 Galvannealed.

2.6 SHOP FINISHING

- A. Steel Sheet: Galvanized to ASTM A653/A653M, A60.

- B. Primer: Baked. ANSI A250.10 rust inhibitive type.
- C. Bituminous Coating: Fibered asphalt emulsion. Coating inside of frames to be set in masonry walls or otherwise grouted solid with cementitious grout. Coating apply after fabrication and after primer has cured.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify existing conditions before starting work.
- C. Verify opening sizes and tolerances are acceptable.
- D. Verify that finished walls are in plane to ensure proper door alignment.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.3 INSTALLATION

- A. Install doors and frames in accordance with ANSI/SDI A250.8.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate installation of doors and frames with indicated types of doors, electrical connections, hardware and glazing panels that are specific to each opening as indicated on the Drawings and in the Specifications.
- D. Install door hardware as specified in Section 08 71 00.
 - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.8 and ANSI/SDI A250.6.
- E. Coordinate installation of door frames and anchors with indicated adjacent wall and floor construction which may include, but not be limited to, concrete, masonry and framed wall construction with indicated finish types.
- F. Grout solid, frames in masonry construction. Prior to grouting, provide bracing sufficient so that pressure of grout will not deform frames.
- G. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.
- H. Comply with glass and glazing installation requirements in Section 08 80 00.
- I. Adjust door for smooth and balanced door movement and latching.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Comply with tolerances and clearances indicated in SDI 117.

- C. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

3.5 SCHEDULE

- A. Refer to Door and Frame Schedule on Drawings.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Flush wood doors.
- B. Related Requirements:
 - 1. Section 08 11 13 - Hollow Metal Doors and Frames: Metal frames for wood doors.
 - 2. Section 08 71 00 - Door Hardware.
 - 3. Section 08 80 00 - Glazing.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
 - 2. ASTM E413 - Classification for Rating Sound Insulation; 2016.
- B. Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada, and Woodwork Institute - Joint Publication (AWI/AWMAC/WI) (AWS):
 - 1. AWS - Architectural Woodwork Standards, 2014.
- C. Architectural Woodwork Institute (AWI):
 - 1. AWI (QCP) - Quality Certification Program.
- D. California Air Resource Board (CARB):
 - 1. CARB - Standard for Ultra-Low Emitting Formaldehyde (ULEF).
- E. Forest Stewardship Council (FSC):
 - 1. FSC - Forest Stewardship Council Standard for Chain of Custody Certification, FSC-STD-40-004, V2-1.
- F. National Fire Protection Association:
 - 1. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
 - 2. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.
- G. Underwriters Laboratories Inc. (UL):
 - 1. UL (Dir) - Online Certifications Directory; current edition.
 - 2. UL 10C - Standard for Safety Positive Pressure Fire Tests of Door Assemblies; 2016.
 - 3. UL 1784 - Standard for Safety Air Leakage Tests of Door Assemblies and Other Opening Protectives; 4th Edition, 2015.

1.3 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this Section. Review the work requirements, project conditions, sequencing, application procedures, quality control, testing and inspection and production schedule.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing.
 - 1. Provide information as required by AWS.
 - 2. Include AWI (QCP) certification program label and project registration identification.
- D. Samples for Initial Selection: Two sets of manufacturer's samples; each 2 x 4 inches; illustrating the full range of wood grains, stain colors and sheens available for products with factory-applied finishes; submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare two samples for each selected finish, color and sheen; on same product material type indicated for final Work; each 8 x 10 inches. Where finishes involve normal finish, color, sheen and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Installation Instructions: Submit special installation instructions.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.
- I. Specimen warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Warranties executed in Owner's name.
- B. AWI (QCP) - Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

- A. Maintain one copy of the specified door quality standards on site for review during installation and finishing.
- B. Comply with AWS standards and Grade indicated, unless otherwise specified or indicated.
 - 1. Grade indicated is minimum requirement. Where the Contract Documents indicate elements of the Work requirements that exceed the minimum Grade indicated, comply with the Contract Documents regarding that element of the Work.
- C. Comply with AWI (QCP) - Quality Certification Program requirements.
 - 1. AWI (QCP) quality certification:
 - a. Register project and comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this Section.
 - b. Provide labels or certificates indicating that installed work will comply with AWS requirements for Grade(s) specified.
 - c. Provide designated labels on shop drawings and installed products as required by certification program.
 - d. Submit certifications upon completion of installation that verifies this work complies with specified requirements.
- D. Attach labels from certifying agencies approved by authority having jurisdiction.
- E. Certified Wood Materials: Furnish wood materials certified in accordance with FSC-STD-40-004, V2-1 including:
 - 1. Face veneer.
 - 2. Core material.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five (5) years documented experience.
 - 1. Licensed participant in AWI (QCP) - Quality Certification Program prior to commencement of fabrication and throughout the duration of the project.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this Section, with not less than five (5) years of documented experience.

1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Provide the necessary framing, blocking, and backing in walls and ceilings adequate for anchorage the Work.
- C. Coordinate Work with door opening construction, door frame and door hardware.
- D. Coordinate fire rating of metal frames to fire rating requirements of doors and wall construction for compliance with overall fire rated separation requirements.
- E. Coordinate frames with smoke and draft control doors to comply with overall assembly requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Package, deliver, and store doors in accordance with AWS Section 2 standards, and door manufacturer requirements.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with AWS Section 2 standards and as follows.
 - 1. Do not deliver or install doors until building space is enclosed and weathertight, wet work is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period. Allow minimum of 72 hours for delivered materials to acclimate to the climate controlled building space before beginning installation.

1.11 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds.
- B. Furnish manufacturer's "Life of Installation" warranty for interior doors, including hanging and finishing if door(s) do not comply with warranty tolerance standards.
 - 1. Include coverage for defective materials, delamination, warping, cupping, bowing, and telegraphing of core construction beyond specified installation tolerances.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Wood Veneer Faced Doors:
 - 1. Masonite International Architectural.
 - 2. Oshkosh Architectural Door Company.
 - 3. Oregon Door.

4. VT Industries.
5. Substitutions: Section 01 60 00 - Product Requirements.

2.2 FLUSH WOOD DOORS - INTERIOR

- A. Grade:
 1. Custom.
- B. Performance:
 1. Extra Heavy Duty.
- C. Door Size and Configuration:
 1. Thickness: 1-3/4 inches thick unless otherwise indicated on Drawings.
 2. Size: As indicated on Drawings.
 3. Glass Panel: As indicated on Drawings.
- D. Non-Rated and 20-min Rated Doors:
 1. Solid Core: Type PC-5, particleboard core, 5-ply.
- E. Fire Rated Doors: Tested to fire ratings indicated on Drawings in accordance with UL 10C-Positive Pressure; UL labeled without any visible seals when door is closed.
 1. Solid Core: Type FD-5 rating as scheduled; Category A for positive pressure fire test, 5-ply.
- F. Door Veneer Facings:
 1. Wood Veneer:
 - a. Finish: Transparent.
 - b. Species:
 - 1) Red Oak.
 - c. Veneer Cut:
 - 1) Rift cut.
 - d. Veneer Adjacent Leaf Matching: Book match.
 - e. Veneer Panel Leaf Matching: Balance match.
 - f. Doors Matching:
 - 1) Pair match.
 - 2) Set match doors within 1 foot of each other (doors closed).

2.3 FABRICATION

- A. Bonding Adhesive: Type I - Waterproof.
 1. Compliant with CARB as ULEF for ultra-low emitting formaldehyde.
- B. Provide solid core blocking reinforcement for hardware applications and as follows:
 1. Lock blocks.
 2. Top rail block for closer.
 3. Center rail for exit bar.
 4. Bottom rail block for kickplates.
 5. Hardware through bolt blocks.
- C. Edges For Veneered Doors:
 1. Vertical Edges: Minimum 7/16 inch hardwood laminated to 1 inch (25mm) structural composite lumber and bonded to door core. Exposed hardwood edge species and finish to match door face veneer.
 2. Horizontal Edges: Minimum 1-7/16 inch structural composite lumber and bonded to door core.

- D. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware. Furnish solid blocking for surface mounted and through bolted hardware.
 - 1. Comply with hardware requirements indicated on Drawings and as specified in Division 08 for the specifications.
 - 2. Include machine work required for securing door perimeter seals.
- E. Door and Frame Fit: Fabricate doors so that door edge clearances of installed doors comply with AWS standards.

2.4 SHOP FINISHING

- A. Transparent:
 - 1. System - 5, Conversion Varnish.
 - a. Sheen to be as selected by Architect from full range of options.
 - 2. Stain Color:
 - a. As selected by Architect from submitted samples.
- B. Seal door top edge with color sealer to match door facing.

2.5 ACCESSORIES

- A. Hardware: As specified in Section 08 71 00 - Door Hardware.
- B. Door Frames: As indicated on Drawings.
- C. Door Louvers: Size to be as indicated on Drawings.
 - 1. Metal Louvers:
 - a. Material and Finish: Roll formed steel; pre-painted finish; color as selected by Architect from full range of options.
 - b. Louver Blades:
 - 1) Inverted V shape.
 - 2) Fire rated to match door with fusible link design to UL (DIR) requirements.
- D. Door View Panels: Size to be as indicated on Drawings.
 - 1. Glazing: As indicated on Drawings, but not less than 1/4 inch (6.4 mm) thick, tempered glass, in compliance with requirements of authorities having jurisdiction.
 - 2. Wood Frame:
 - a. Glazing Stops: Solid wood material, of same species and finish as door facing, lip profile; mitered corners; fasteners to be countersunk, fill and finish to match glazing stop finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.

- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Comply with AWS standards and Grade indicated, and manufacturer's requirements, unless otherwise specified or indicated
 - 1. Fire Rated Doors: Comply with NFPA 80, and fire ratings as indicated on Drawings.
 - 2. Smoke and Draft Control Doors: Comply with NFPA 105, and smoke and draft control requirements as indicated on Drawings.
- C. Coordinate installation of doors with installation of frames and hardware.
- D. Install door louvers and vision panels plumb and level.
 - 1. Wood Glazing Stops: Countersink fasteners, fill and finish to match glazing stop finish.

3.4 INSTALLATION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Comply with AWS standards and Grade indicated, unless otherwise specified or indicated
- C. Maximum Vertical or Horizontal Distortion (Bow or Cup): Maximum 1/8 inch measured at center distance from any edge or corner of door.
- D. Comply with AWS tolerance requirements and as follows:
 - 1. Telegraph: Maximum 0.010 inch in any 3 inch span.
 - 2. Warp: Maximum 0.125 inch per 7 feet of door section.
 - 3. Squareness: Maximum diagonal variance of 1/8 inch.
 - 4. Door to Frame Fit and Clearance: 0.125 inch gap.

3.5 ADJUSTING

- A. Section 01 73 00 - Execution: Adjusting.
- B. Adjust door for smooth and balanced door movement and latching.

3.6 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.
- B. Clean installed work in accordance with manufacturer's recommended materials and procedures.

3.7 SCHEDULE

- A. As indicated on Drawings.

END OF SECTION

SECTION 08 17 43

INTEGRATED COMPOSITE DOOR OPENING ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes fiber reinforced polyester (FRP) faced aluminum doors and frames.
- B. Related Requirements:
 - 1. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
 - 2. Section 08 80 00 - Glazing.

1.2 REFERENCES

- A. American Architectural Manufacturers Association:
 - 1. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
 - 2. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix), 2017.
- B. ASTM International:
 - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 3. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
 - 4. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.

1.3 SYSTEM DESCRIPTION

- A. Aluminum framed entrance system with aluminum doors faced with fiber reinforced polyester faces.

1.4 PERFORMANCE REQUIREMENTS

- A. System Design: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall, including building corners.
 - 1. To design pressure of 6.24 lb/sq ft, as tested in accordance with ASTM E330.
- B. System Assembly: Accommodate without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.
- C. Water Leakage: None, when measured in accordance with ASTM E331 with test pressure difference of 20 percent of design pressure, with minimum differential of 2.86 lbf/sq ft and maximum of 12.00 lbf/sq ft.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.
- C. Product Data: Submit component dimensions; describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- D. Samples for Initial Selection: Two manufacturer's complete set of color samples illustrating the full range of finishes and colors available. Include samples for FRP surfaces, aluminum frame finishes, glass units, infill panels, glazing materials. Submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples to be same product material type indicated for final Work; each sample 8 x 8 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Protect finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.8 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Furnish ten (10) year manufacturer's warranty for doors and frames systems.

PART 2 PRODUCTS

2.1 INTEGRATED COMPOSITE DOOR OPENING ASSEMBLIES

- A. Manufacturers:
 - 1. Eliason Corporation.
 - 2. Kawneer Co., Inc.
 - 3. Oldcastle Building Envelope.
 - 4. Special-Lite, Inc.
 - 5. Substitutions: Section 01 60 00 - Product Requirements.
- B. Product Description:
 - 1. Aluminum Frame: Non-thermally broken; applied door stops.
 - 2. Door: Fiber reinforced polyester faced aluminum framed doors.
 - 3. Door Thickness: As indicated on Drawings, but not less than 1-3/4 inches thick.
 - 4. Door Size: As indicated on Drawings.

2.2 COMPONENTS

- A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical, 6061 alloy, T6 temper for extruded structural members.
- B. Sheet Aluminum: ASTM B209, 5005 alloy, H15 or H34 temper.
- C. Door Face: Fiber reinforced polyester, 0.120 inch thick; pebble finish.
- D. Reinforcement for Hardware: Provide minimum internal 3/16" steel reinforcing.
- E. Insulation:
 - 1. 25 psi density polystyrene core.
- F. Hardware:
 - 1. Coordinate with Section 08 71 00 – Door Hardware and provide door hardware for types of doors, applications and hardware indicated:
 - a. Weatherstripping: Wool pile, continuous and replaceable.
 - b. Hinges: Specified in Section 08 71 00. Continuous type, non-removable pin.
 - c. Threshold: Specified in Section 08 71 00. Extruded aluminum, one piece for each door opening, ribbed surface.
 - d. Panic Device: Specified in Section 08 71 00.
 - e. Closer: Specified in Section 08 71 00.
 - f. Lock Cylinders: Specified in Section 08 71 00.
 - g. Finish: Exposed hardware to match hardware finishes specified in Section 08 71 00.
- G. Fasteners: Stainless steel.
- H. Vision Lights:
 - 1. Manufacturer's integral aluminum frame, factory glazed with 1 inch insulated tempered glass as specified in Section 08 80 00 – Glazing for glazing type. Allow for thermal movement.

2.3 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Door configuration indicating Stiles and Rails:
 - 1. Side Stiles: As indicated on Drawings, but not less than 5-1/2 inches wide, reinforced minimum 3/16 inch thick.
 - 2. Top and Bottom Rails: As indicated on Drawings, but not less than 6 inches wide, reinforced minimum 3/16 inch thick.
- C. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- D. Prepare components to receive anchor devices. Fabricate anchors.
- E. Arrange fasteners and attachments to conceal from view.
- F. Prepare components with heavy duty internal reinforcement for door hardware.
- G. Reinforce framing members for imposed loads.

2.4 SHOP FINISHING

- A. Painted Aluminum Surfaces: AA-M12C12R1x non-specular as fabricated mechanical finish, chemically cleaned, and prepared for applied coating; with organic coating.
 - 1. High Performance Organic Coating: Fluoropolymer coating system complying with AAMA 2604 minimum two-coat, with minimum 70 percent polyvinylidene fluoride resin.
 - 2. Color: To match door frame in which door is set.

- B. FRP: As selected by Architect from manufacturer's full range of colors and finishes.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Examine substrates for conditions detrimental to installation of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Examine products to be installed for damage and other conditions detrimental to completion of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Verify dimensions, tolerances, and method of attachment with other Work.
- E. Verify wall openings are ready to receive Work of this Section.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- G. Set thresholds in bed of mastic and secure.
- H. Install hardware using templates provided. Refer to Section 08 71 00 for installation requirements.
- I. Install infill panels using method required to achieve performance criteria.
- J. Coordinate installation of perimeter sealants with Section 07 90 00.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.5 ADJUSTING

- A. Section 01 73 00 - Execution: Adjusting requirements.
- B. Adjust door for smooth and balanced door movement and latching.

3.6 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures.
- B. Clean installed work and comply with manufacturer's recommendations.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed construction from damage.

END OF SECTION

SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes fire resistive rated and non-rated access doors and panels with frames.
- B. Related Requirements:
 - 1. Section 04 20 00 - Unit Masonry: Placement of access frame unit anchors in masonry partitions.
 - 2. Section 09 21 16 - Gypsum Board Assemblies: Placement of access frame unit anchors in gypsum board partitions.
 - 3. Section 09 90 00 - Painting and Coating: Field paint finish.
 - 4. Divisions of Work such as plumbing, HVAC and electrical construction requiring access doors.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- B. Intertek Testing Services (Warnock Hersey Listed):
 - 1. WH - Certification Listings.
- C. National Fire Protection Association:
 - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
- D. Underwriters Laboratories Inc.:
 - 1. UL - Building Materials Directory.

1.3 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate Work with work and devices requiring access to controls, valves, traps, dampers, cleanouts, and similar items located behind finished surfaces, but requiring operation and maintenance. Provide access doors and frames for such access.
- C. Coordinate exact locations with various trades and local code requirements to assure proper placement of access doors and panels.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit literature indicating sizes, types, finishes, hardware, scheduled locations, fire resistance listings, and details of adjoining Work.
- C. Shop Drawings: Indicate exact position of access door units.
- D. Manufacturer's Installation Instructions: Submit installation requirements and rough-in dimensions.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 77 00 - Closeout Procedures.

- B. Project Record Documents: Record actual locations of access units.

1.6 QUALITY ASSURANCE

- A. Fire Resistance Ratings: Where indicated as fire rated provide assemblies from manufacturers listed in UL Directory or Intertek Testing Services (Warnock Hersey Listed) Directory.
- B. Fire Rated Horizontal Access Doors: Rating as indicated on Drawings.
 - 1. Tested Rating: Determined in accordance with ASTM E119.
- C. Attach label from agency approved by authority having jurisdiction to identify each fire rated access door.

PART 2 PRODUCTS

2.1 ACCESS DOORS AND PANELS

- A. Manufacturers:
 - 1. Acudor Products, Inc.
 - 2. J. L. Industries.
 - 3. Karp Associates, Inc.
 - 4. Nystrom Products Co.
 - 5. Milcor LTD, Partnership.
 - 6. Substitutions: Section 01 60 00 - Product Requirements.
- B. Flush Framed Access Doors (Type 1): Frames and nominal 1 inch wide exposed flanges of 16 gage steel and door panels of 14 gage steel.
- C. Gypsum Board Access Doors (Type 2): Frames and nominal 1 inch wide flanges of 16 gage steel and door panels of 14 gage steel. Design flanges to be concealed by gypsum board joint finishing compound specified in Section 09 21 16.
- D. Fire Rated Access Doors (Type 3): Frames and nominal 1 inch wide exposed flanges of minimum 16 gage steel and door panels of 20 gage steel. Provide self closing and latching doors with keyed lock to match cylinders specified in Section 08 71 00.
- E. Gypsum Board Fire Rated Access Doors (Type 4): 16 gage steel frames with minimum 22 gage galvanized steel drywall bead flanges and door panels of 20 gage steel. Design flanges to be concealed by gypsum board joint finishing compound specified in Section 09 21 16. Provide self closing and latching doors with keyed lock to match cylinders specified in Section 08 71 00.

2.2 FABRICATION

- A. Fabricate units of continuous welded construction; weld, fill, and grind joints to assure flush and square unit.
- B. Wall and Ceiling Access Door and Panel Hardware:
 - 1. Hinge: Standard continuous or concealed spring pin type, 175 degree steel hinges.
 - 2. Lock: Screw driver slot for quarter turn cam lock.
- C. Size Variations: Obtain acceptance of manufacturer's standard size units which vary slightly from sizes shown or scheduled.

2.3 SHOP FINISHING

- A. Base Metal Protection: Prime coat units with baked on primer; compatible with indicated finish system.

- B. Finish: Paint after installation to match adjacent material finish. Refer to Section 09 90 00 - Painting and Coating.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Examine substrates for conditions detrimental to installation of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Verify rough openings for access doors and panels are correctly sized and located.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Secure frames rigidly in place, plumb and level in opening, with plane of door and panel face aligned with adjacent finished surfaces.
 - 1. Set concealed frame type units flush with adjacent finished surfaces.
- C. Position unit to provide convenient access to concealed work requiring access.
- D. Install fire rated units in accordance with NFPA 80 and requirements for fire listing.

3.4 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust opening/closing and latch operation to smooth operation.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.
- B. Clean installed work in accordance with manufacturer's recommended materials and procedures.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protect installed construction.

END OF SECTION

SECTION 08 33 13
COILING COUNTER DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Overhead coiling counter doors.
 - 2. Operating hardware.
- B. Related Requirements:
 - 1. Section 08 71 00 - Door Hardware: Lock cylinder type.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
 - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit general construction, component connections and details.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 8 inches long. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, and adjustment and alignment procedures.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience and approved by manufacturer.

1.6 WARRANTY

- A. Warranty: Manufacturer's warranty that all parts and components, except counterbalance spring and finish, are to be free from defects in materials and workmanship for five (5) years. Counterbalance springs to be warranted for one (1) year.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Design and install overhead coiling door system to withstand the effects of earthquake motions in accordance with ASCE 7 and the local authorities having jurisdiction.
- B. Operation Cycles: Design complete door assembly including operator for usage of up to 20 cycles per day.
- C. Manual Operation: Manual hand crank lift or push up unit with overhead counter balance device, requiring 25 lb nominal force to operate.
- D. Source Limitations: Provide overhead coiling doors from one manufacturer for each type of door. Provide operators and other accessories from source acceptable to overhead coiling door manufacturer.

2.2 COILING COUNTER DOORS

- A. Manufacturers:
 - 1. Wayne Dalton - Model 500. (Basis of Design)
 - 2. C.H.I. Overhead Doors - Model 6500 Series.
 - 3. Cookson Co.
 - 4. Cornell Iron Works, Inc.
 - 5. Overhead Door Corporation.
 - 6. Raynor Garage Door.
 - 7. Substitutions: Section 01 60 00 - Product Requirements.

2.3 COMPONENTS

- A. Curtain:
 - 1. Aluminum Slats: Extruded aluminum; ASTM B221, alloy 6063, temper T5; 0.050 inch thickness minimum.
 - 2. Slat Profile: Single thickness flat slat.
 - 3. Slat Size: Nominal 1-1/2 or 2 inches wide by required length.
 - 4. Slat Ends: Each slat fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
 - 5. Curtain Bottom: Extruded aluminum; rectangular tube shape bottom bar fitted with a continuous vinyl bumper to protect finished sill top or countertop. Provide integral latch and locking devices.
- B. Guides: Extruded aluminum; ASTM B221, alloy 6063, temper T5; with removable curtain stops; continuous strips of wool pile inserted into guides to eliminate metal-to-metal contact and to provide dust-seal around curtain.
- C. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension.

- D. Hood Enclosure and Fascia: Square shaped formed aluminum; ASTM B209 (ASTM B209M), alloy 5005, temper H14, stretcher leveled; 20 gage (0.032 inch) thick minimum; internally reinforced to maintain rigidity and shape.
- E. Manual Operation:
 - 1. Manual push-up.
- F. Hardware:
 - 1. Interior Side of Curtain: Center mounted hand turn lock with latch engaging keepers at each curtain guide. Provide two lift handles 20 inches apart.
- G. Mounting:
 - 1. Face of wall with hood above opening head, unless indicated otherwise on Drawings.
- H. Fasteners, Bolts and Anchor Devices: Non-corrosive type; finish to match adjacent material finish, size suitable for loads and to provide secure anchorage.

2.4 SHOP APPLIED FINISH

- A. Aluminum: Natural anodized finish with organic seal, AAMA 612 clear anodic coating with non-aqueous electro-deposited organic seal; not less than 0.7 mils (0.018 mm) thick.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify opening sizes, tolerances and conditions are acceptable.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Use anchorage devices to securely fasten assembly to wall construction without distortion or stress.
- C. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- D. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 00.
- E. Install perimeter trim and closures.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maintain dimensional tolerances and alignment with adjacent Work.
- C. Maximum Variation From Plumb: 1/16 inch.
- D. Maximum Variation From Level: 1/16 inch.
- E. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.5 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust counter door, hardware and operating assemblies for smooth and noiseless operation.

3.6 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Remove labels and visible markings.
- C. Clean counter door and components in accordance with manufacturer's recommended materials and instructions.

END OF SECTION

SECTION 08 33 26
OVERHEAD COILING GRILLES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manual Operating coiling metal grilles and operating hardware.
- B. Related Requirements:
 - 1. Section 04 20 00 - Unit Masonry: Adjacent wall construction.
 - 2. Section 08 71.00 - Door Hardware: Lock cylinders and keys.
 - 3. Section 09 21 16 - Gypsum Board Assemblies: Adjacent wall and ceiling construction.
 - 4. Section 09 51 13 - Acoustical Panel Ceilings: Adjacent ceiling construction.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- B. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
 - 3. NEMA MG 1 - Motors and Generators.
- C. Underwriters Laboratories Inc.:
 - 1. UL 325 - Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.3 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate keying requirements with Owner.
- C. For Grilles Requiring Electrical Connections: Coordinate with this Section, Division 26 - Electrical, and Drawings to provide connectivity as indicated. Such connections may include, but not be limited to the following:
 - 1. Electrical Service for powering components.
 - 2. Facility Monitoring Systems that may include, but not be limited to, fire alarm system, security alarm system, etc.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
 - 1. Manual Operation: Submit general construction, component connections and details.
- C. Shop Drawings: Indicate pertinent components, dimensioning, anchorage methods, hardware locations, interface with adjacent construction and installation details.
- D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selections.

- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 8 inches long. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Certification: Certificate stating that materials comply with this specification.
- G. Manufacturer's Installation Instructions: Submit installation sequence and procedures, adjustment and alignment procedures.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 77 00 - Closeout Procedures.
- B. Operation and Maintenance Data: Indicate lubrication requirements and frequency, and periodic adjustments required.

1.6 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by UL, or another testing firm acceptable to authority having jurisdiction.
- B. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
- C. Installer: Company specializing in performing Work of this section with minimum three (3) years documented experience and approved by manufacturer.

1.7 DELIVERY STORAGE AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Follow manufacturer's instructions.

1.8 PROJECT CONDITIONS

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

1.9 WARRANTY

- A. Provide two (2) year manufacturer's warranty covering defects in material and workmanship, starting on the date of substantial completion.
- B. Maintenance Service Agreement Proposal: Submit for Owner's consideration and acceptance of a maintenance service agreement for installed Work.

PART 2 PRODUCTS

2.1 OVERHEAD COILING GRILLES

- A. Manufacturers:
 - 1. Atlas Roll-Lite Overhead Doors.
 - 2. Cornell/Cookson, Inc. - VisionAire ESG10. (Basis of Design)
 - 3. Clopay Building Products.
 - 4. Mahon Door Corporation

5. Overhead Door Corporation.
6. Wayne-Dalton, a Division of Overhead Door Corporation.
7. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

- A. Grilles: Straight pattern grilles conforming to the following.
 1. Material: Aluminum conforming to ASTM B221.
 2. Horizontal Rods: Solid 5/16 inch diameter, minimum.
 - a. Vertical Spacing: 2 inches o.c.
 3. Vertical Connecting Members: 5/8 x 1/8 inch flat aluminum bar, links spaced at 9 inch o.c.
 4. Ends: Members with nylon runners for quiet operation.
 5. Bottom Bar: 2 x 3-1/2 inch extruded aluminum tubular section reinforced with two 3 x 2 x 3/16 inch aluminum angles.
 6. Mechanical Assist Lift: Provide special lift mechanism for large grilles.
- B. Guides: Extruded aluminum conforming to ASTM B221.
 1. Provide continuous angles of profile to retain grille in place with snap-on trim; mounting brackets of same metal.
- C. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to assure smooth operation of grille from any position; with adjustable spring tension.
- D. Hood Enclosure: Square shape, minimum 24 gage (0.040 inch) thick aluminum; internally reinforced to maintain rigidity and shape.
- E. Hardware:
 1. Locks: Furnish locks and keys to allow curtain to be secured.
 - a. Cylinder type dead lock at curtain jamb; key operated on outside and turn latch operated on inside.
 - 1) Prepare curtain with lock mechanism to receive keyed cylinder as specified and furnished in Section 08 71 00, and installed as part of Work of this Section.
 2. Latch Handle: Inside center mounted, adjustable keeper, spring activated latch bar with feature to keep locked fully open and closed position; interior and exterior handle.
- F. Manual Operation:
 1. Design grille assembly to operate for not less than 30,000 cycles.
 2. Manual push up unit with overhead counter balance device, requiring 25 lbs. nominal force to operate.
 3. Walk-Through Openings: Chain operated curtain designed to provide for immediate curtain stops in upward and downward travel, and to maintain a stationary position when the hand chain is released by user.
 4. Pass-Through Windows 6 ft Wide or Less: Two (2) full-grip handles, mounted at 24 inches apart and centered on inside of bottom rail. Adjust counterbalance for easy hand lift operation.

2.3 FINISHES

- A. Grille Components:
 1. To be selected by Architect from submitted samples.
- B. Guides and Hood Enclosure: Match grille finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify opening sizes, tolerances and conditions are acceptable.
- C. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- D. For Grilles Requiring Electrical Connections: Verify that compatible electrical service connectivity is present and that recessed controls boxes and conduits are ready for installation.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install the Work in accordance with manufacturer's instructions and as follows:
- C. Use anchor devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- E. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- F. For Doors Requiring Electrical Connections: Coordinate with this Section, Division 26 - Electrical, and Drawings.
 - 1. Electrical Service: Install wiring from electrical service location to electrical components and include appropriate service disconnect devices.
 - 2. Facility Monitoring Systems: Install wiring connections from door operator mechanism to facility monitoring systems when requirements are indicated. Such monitoring systems may include, but not be limited to, fire alarm system, security alarm system, etc.
- G. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 00.
- H. Install perimeter trim and closures.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maintain dimensional tolerances and alignment with adjacent Work.
- C. Maximum Variation From Plumb: 1/16 inch.
- D. Maximum Variation From Level: 1/16 inch.
- E. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.5 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust components, hardware, and operating assemblies for smooth and quiet operation, without binding or distortion.
- C. Test required interface functionality with Facility Monitoring Systems.

3.6 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean installed Work in accordance with manufacturer's recommendations including cleaning procedures and materials.
- C. Remove unneeded labels and visible markings.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protect installed construction.
- B. Protect completed Work from damage.

3.8 DEMONSTRATION AND TRAINING

- A. Section 01 79 00 - Demonstration and Training: Provide demonstration and training to the Owner regarding operation and maintenance of components of the installed Work.

END OF SECTION

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum-framed storefront systems.
 - 2. Glass and glazing panels.
 - 3. Aluminum frame doors and hardware.
 - 4. Structural design requirement.

- B. Related Requirements:
 - 1. Section 05 50 00 - Metal Fabrications: Metal fabricated attachment devices.
 - 2. Section 07 90 00 - Joint Protection: Perimeter joint sealers other than those integral to the aluminum-framed entrances and storefronts frames and glazing.
 - 3. Section 08 17 43 - Integrated Composite Door Opening Assemblies.
 - 4. Section 08 14 16 - Flush Wood Doors.
 - 5. Section 08 44 13 - Glazed Aluminum Curtain Walls.
 - 6. Section 08 71 00 - Door Hardware:
 - a. Provide reinforcement in storefront framing members to accommodate hardware items other than items specified in this Section.
 - b. Preparation of storefront framing members to accommodate electrical hardware devices such as security access readers and automatic operators.
 - 7. Section 08 80 00 - Glazing: Glazing for aluminum-framed entrances and storefronts.
 - 8. Division 26 - Electrical:
 - a. Coordination for electrical service for electrical hardware devices such as security access readers and automatic operators.

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
 - 2. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
 - 3. AAMA 611, AA-M12C22A41 - Clear Anodized Aluminum Surfaces.
 - 4. AAMA 611, AA-M12C22A44 - Color Anodized Aluminum Surfaces, Electrolytically Deposited Colored Anodic Finish.
 - 5. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
 - 6. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017.
 - 7. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017.
 - 8. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
 - 9. AAMA SFM-1 - Aluminum Store Front and Entrance Manual.

- B. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

- C. ASTM International (ASTM):

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 4. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 5. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants, 2015 (Revision 15A).
 6. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 7. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 8. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- D. The Society for Protective Coatings (SSPC):
1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

1.3 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this Section.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit component dimensions; describe components within assembly, anchorage and fasteners, glass and infill panels, door hardware, and internal drainage details.
- C. Shop Drawings: Indicate system dimensions, doors and frames, framed opening requirements and tolerances, anticipated deflection under load, affected related work, weep drainage network, expansion and contraction joint location and details, and field welding required.
 1. Details to indicate system interface and maintenance of continuity of building envelope air and weather barrier components by others.
 2. Provide design and calculations sealed by Professional Structural Engineer demonstrating compliance with wind loading per ASCE 7.
 3. Include details of core stile and rail construction, trim for lites and all other components.
 4. Include details of finish hardware mounting.
 5. Include shop and field sealants by manufacture and product name, and locate on drawings. Show sealant joint sizes, including tolerances and maximum/minimum joint sizes required.
- D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 8 x 8 inches. Include samples of glazing, infill panels and glazing materials. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

- F. Design Data: Indicate engineered framing members structural and physical characteristics, calculations, dimensional limitations.
- G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- H. Installation Data: Special installation requirements.
- I. Field Quality Control Submittals:
 - 1. Reports of manufacturer's field visits.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with AAMA SFM-1 - Aluminum Storefront and Entrance Manual.
- B. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the State in which the Project is located.
- C. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five (5) years documented experience.
- D. Installer: Company specializing in performing Work of this Section with minimum five (5) years documented experience.

1.6 DELIVERY, STORAGE, AND PROTECTION

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Handle products of this Section in accordance with AAMA CW-10.
- C. Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Provide for adequate ventilation through wrappings.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Requirements before, during and after installation of Work.
- B. Do not install sealants when ambient temperature is less than 40 degrees F during and 48 hours after installation.

1.8 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Provide five (5) year warranty to correct defective Work.
- C. Provide five (5) year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting, condensation or misting. Include provision for replacement of failed units.
- D. Provide manufacturer warranty against excessive degradation of metal finishes. Include provision for replacement of units with excessive fading, chalking, peeling, blistering, or flaking. Warranty period to be as follow:
 - 1. Ten (10) year manufacturer warranty.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Aluminum-Framed Storefront System: Includes extruded aluminum framing and doors with supplementary internal support components where required, aluminum and glass entrances, shop fabricated components, factory finished, glass, glazing and infill panels, related joint sealers, flashings, anchorage and attachment devices.
- B. Provide products and system designed to comply with the State Building Code for the State in which the project is located.

2.2 PERFORMANCE REQUIREMENTS

- A. Wind Loads: Design and size components and system to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall, including increased wind loads at building corners.
 - 1. As calculated in accordance with ASCE 7 - Calculation of Wind Loads, as measured in accordance with ASTM E330.
 - 2. Comply with Design Loads indicated on Drawings and applicable code requirements based on geographical location.
- B. Seismic Loads: Design and size components and system to withstand seismic loads and sway displacement as calculated in accordance with ASCE 7 and applicable code requirements.
- C. Deflection: Limit mullion deflection to flexure limit of glass of span; with full recovery of glazing materials.
- D. System Assembly: Accommodate the following without damage to system, components, or deterioration of seals.
 - 1. Movement within system.
 - 2. Movement between system, system components and perimeter construction.
 - 3. Dynamic loading and release of loads.
 - 4. Deflection of structural support framing.
 - 5. Tolerance of supporting components.
- E. Air Infiltration: Limit air leakage through assembly to 0.06 cfm/min/sq ft of wall area, measured at reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E283.
- F. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
- G. Vapor Seal: Limit vapor seal with interior atmospheric pressure of 1 inch static pressure, 72 degrees F, 40 percent relative humidity without seal failure.
- H. Water Leakage: None, when measured in accordance with ASTM E331 with test pressure difference of 20 percent of design pressure, with minimum differential of 2.86 lbf/sq ft and maximum of 12.00 lbf/sq ft.
- I. Thermal Transmittance of Assembly (Excluding Entrances): Maximum U Value of 0.45 Btu/sq ft per hour per deg F when measured in accordance with AAMA 1503.
- J. Expansion / Contraction: System to provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over 12 hour period without causing detrimental effect to system components and anchorage.

- K. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.
- L. Not Permitted: Vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system.

2.3 ALUMINUM-FRAMED STOREFRONTS

- A. Exterior Storefronts: Application to be where one side of storefront is exposed to unconditioned air; includes building exterior exposure.
 - 1. Extruded aluminum frame members with internal reinforcement of aluminum or shaped steel structural sections as required to withstand imposed loads, including loads imposed by operating doors and hardware of types and sizes indicated.
 - 2. Frame components to be thermally broken from exterior exposed surfaces.
 - 3. Frame size, configuration, dimensions, and profile: As indicated on Drawings.
 - a. For frames with laminated glass panels, coordinate with glass panel thickness.
 - b. Continuous perimeter filler.
 - 4. Multiple pane insulated glass and infill panels.
 - 5. Glass, glazing panels and panel position in frame:
 - a. As indicated on Drawings.
 - 6. Exterior Subsills: High performance type, profile of extruded aluminum, thermally broken, with back flange turned up full height of frame face and sealed end dams each end.
 - 7. Internal weep drainage system to drain to exterior.
 - 8. Manufacturers:
 - a. Kawneer Co., Inc. (Basis of Design)
 - 1) Trifab VG 451T, 2 inch sightline.
 - b. Oldcastle BuildingEnvelope.
 - c. Tubelite, Inc.
 - d. U.S. Aluminum, a C.R. Lurance Company.
 - e. YKK AP America.
 - f. Substitutions: Section 01 60 00 - Product Requirements.
- B. Interior Storefronts: Application to be as partitions between building interior spaces with conditioned air on both sides.
 - 1. Extruded aluminum frame members with internal reinforcement of aluminum or shaped steel structural sections as required to withstand imposed loads, including loads imposed by operating doors and hardware of types and sizes indicated.
 - 2. Frame components not required to be thermally broken.
 - 3. Frame size, configuration, dimensions, and profile: As indicated on Drawings.
 - a. For frames with laminated glass panels, coordinate with glass panel thickness.
 - 4. Single pane non-insulated glazing and infill panels.
 - 5. Glass, glazing panels and panel position in frame:
 - a. As indicated on Drawings.
 - 6. Manufacturers:
 - a. Kawneer Co., Inc. (Basis of Design)
 - 1) Trifab VG 451, 2 inch sightline.
 - b. Oldcastle BuildingEnvelope.
 - c. Tubelite, Inc.
 - d. U.S. Aluminum, a C.R. Lurance Company.
 - e. YKK AP America.
 - f. Substitutions: Section 01 60 00 - Product Requirements.

- C. Same manufacturer must be used for:
 - 1. Aluminum-Framed Entrances and Storefronts.
 - 2. Glazed Aluminum Curtain Walls.

2.4 COMPONENTS

- A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical, 6061 alloy, T6 temper for extruded structural members.
- B. Sheet Aluminum: ASTM B209, 5005 alloy, H15 or H34 temper, wall thickness as required for system application and use but not less than 0.125 inch.
- C. Sheet Steel: ASTM A653/A653M; galvanized to minimum G90.
- D. Steel Sections: ASTM A36/A36M; shaped to suit aluminum framing and mullion members
 - 1. For Use In Exterior Aluminum-Framed Storefront Systems: Galvanized in accordance with ASTM A123/A123M.
 - 2. For Use In Interior Aluminum-Framed Storefront Systems: Shop primed.
- E. Structural Supporting Anchors Attached to Structural Steel:
 - 1. Design to suite attachment requirements.
- F. Structural Supporting Anchors Attached to Reinforced Concrete Members:
 - 1. Design to suite attachment requirements.
- G. Fasteners: Provide Aluminum, non-magnetic stainless steel, or other non-corrosive metal fasteners, guaranteed by the manufacturer to be compatible with the doors, frames, stops, panels, hardware, anchors, and other items being fastened. For exposed fasteners (if any) provide Oval Phillips Head screws with finish matching the item to be fastened. The use of sex bolts will not be accepted.
- H. Framing Members Profiles: Extruded aluminum and as indicated on Drawings.
- I. Trim Components Profiles: Extruded aluminum and as indicated on Drawings.
- J. Glass and Glazing Panels:
 - 1. As indicated on Drawings.
 - 2. As specified in Section 08 80 00 - Glazing.
- K. Doors:
 - 1. Material: As indicated on Drawings.
 - 2. Thickness: As indicated on Drawings.
 - 3. Storefront Framing Members:
 - a. Coordinate frame's door stop and door silencer feature (along the frame stop) with door thickness and door type indicated on Drawings.
 - b. Coordinate reinforcement and shop preparation with door hardware, including closers, hinges, latching and locking components, automatic door operators, and other hardware indicated in other Sections.
 - c. Coordinate storefront frames with the specified doors, types, weight and hardware and as indicated. Provide aluminum storefront frames with internal and concealed reinforcement and anchorage required to support attachment of the hinges and closers and to withstand the operating and closing loads imposed on the storefront frames by the specified doors and hardware. (e.g. The heavy weight of a solid wood door imposes greater operating loads on door frame members than aluminum and FRP doors.)
 - d. Coordinate with security, safety and other electrical wiring and hardware requirements such as automatic door operators and actuators.
 - 4. Glass and Glazing Panels:
 - a. As indicated on Drawings.

5. Glazing Stops Profile: As indicated on Drawings.
 6. Stiles and Rails: Extruded aluminum; profiles as indicated on Drawings.
 - a. Exterior door components to be thermally broken; interior door components not required to be thermally broken.
 - b. Coordinate reinforcement and shop preparation with door hardware attachment and operating requirements.
 - c. Unless Indicated Otherwise on Drawings:
 - 1) Stiles to be 6 inches.
 - 2) Top and middle rails to be 6 inches.
 - a) Doors scheduled to receive exit hardware device to be fabricated with middle rail.
 - 3) Bottom rails to be 10 inches.
 7. Finish: For aluminum framed doors, finish to match storefront frame in which the door is set. Finish for other door types shall be as indicated on Drawings or in other Sections.
- L. Door Hardware:
1. Weatherstripping and Sill Sweep Strips: For aluminum frame doors, manufacturer's standard type to suit application; removable for maintenance replacement.
 2. Threshold: Specified in Section 08 71 00. Extruded aluminum, one piece for each door opening, ribbed non-slip surface.
 3. Hinges: Specified in Section 08 71 00.
 4. Exit Panic Devices: Specified in Section 08 71 00.
 5. Closers: Specified in Section 08 71 00.
 6. Automatic Door Operators and Actuators: Specified in Section 08 71 00.
 7. Lock Cylinders: Specified in Section 08 71 00.
 8. Other hardware as may be indicated on Drawings or in Section 08 71 00.
 9. Finish: Exposed hardware to match hardware finishes specified in Section 08 71 00.
- M. Flashings:
1. Exposed Flashings: Sheet aluminum, finish to match framing members.
 - a. Thickness: 18 gage, 0.040 inch, minimum.
 2. Concealed Flashings: Sheet aluminum.
 - a. Thickness: 22 gage, 0.025 inch, minimum.
- N. Firestopping: As specified in Section 07 84 00.
- O. Storefront System Sealants: As recommended by storefront system manufacturer; compatible with glazing panels, infill panels, framing members, flashings and other components and accessories.
- P. Glazing Gaskets and Accessories: As recommended by storefront and glazing system manufacturers; type to suit application to achieve weather, moisture, and air infiltration requirements.
- Q. Perimeter Sealants and Backing Materials: Provide sealants and backing materials complying with requirements specified in Section 07 90 00.
- R. Sealant for Setting Thresholds: Non-curing butyl type.

2.5 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

- C. Provide System Internal Drainage: Drain to the exterior by means of a weep drainage networks any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
- D. Prepare system members to receive anchor devices. Fabricate anchors.
- E. Arrange fasteners and attachments to conceal from view.
- F. Prepare system members with internal reinforcement for door hardware.
- G. Prepare system members for installation of door hardware and electrical hardware devices such as security access readers and automatic operators.
- H. Prepare components with internal reinforcement for window treatments.
- I. Reinforce framing members to withstand external imposed loads.
- J. Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.

2.6 SHOP FINISHING

- A. Anodized Aluminum Finish:
 - 1. Color Anodized Finish: AAMA 611, AA-M12C22A44 Electrolytically deposited colored anodic coating; Class I, not less than 0.7 mils thick.
- B. Color and Gloss: As selected by Architect from submitted samples.
- C. Touch-Up Materials: As recommended by finish manufacturer for field application.
- D. Extent of Finish:
 - 1. Apply factory coating to surfaces exposed at completed assemblies.
 - 2. Apply finish to surfaces cut during fabrication so no natural aluminum is visible in completed assemblies, including joint edges.
 - 3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.
- E. Concealed Steel Items: Galvanized to ASTM A123/A123M; minimum 2.0 oz/sq ft coating thickness; galvanize after fabrication.
- F. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar metals.
- G. Touch-Up Primer for Galvanized Steel Surfaces: SSPC Paint 20 zinc rich.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify dimensions, tolerances, and method of attachment with other Work.
- C. Verify wall openings are ready to receive Work of this Section.
- D. Verify that construction to which the Work is to be anchored is complete, structurally sound and adequate to provide the required securement.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install wall system in accordance with engineered design, manufacturer's instructions, and AAMA SFM-1 - Aluminum Storefront and Entrance Manual.
- C. Installation to interface with and maintain continuity of building envelope air and weather barrier components by others.
- D. Coordinate with installers of other products to be installed as integral or surface mounted components to the Work required in this Section.
 - 1. Provide open pathways for electrical wiring and device attachment requirements, to include, but not limited to, the following:
 - a. Electrical hardware devices such as security access readers and automatic operators.
 - b. Electrical life safety and security devices.
- E. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- F. Provide alignment attachments and shims to permanently fasten system to building structure.
- G. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent Work.
- H. Provide thermal isolation where components penetrate or disrupt building insulation.
- I. Install sill flashings. Turn up ends and edges; seal to adjacent Work to form water tight dam.
- J. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- K. Install integral flashings and integral joint sealers.
- L. Set thresholds in bed setting sealant and secure.
- M. Install hardware using hardware manufacturer's templates. Refer to Section 08 71 00 for door hardware requirements other than specified in this Section.
- N. Glazing:
 - 1. Coordinate installation of glass with Section 08 80 00 - Glazing; separate glass from metal surfaces.
- O. Install system weather seal sealants, seals, gaskets and glazing and infill panels to achieve performance criteria.
- P. Install perimeter sealant and backer to achieve performance criteria conforming with installation criteria specified in Section 07 90 00.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Monitor quality of installation, inspection, and testing.
- B. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

3.5 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.

- B. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.
- C. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.6 ADJUSTING

- A. Section 01 73 00 - Execution: Testing and adjusting.
- B. Adjust operating hardware for smooth operation and latching.

3.7 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Remove protective material from pre-finished aluminum surfaces.
- C. Wash down surfaces with solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- D. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.
- E. Remove excess sealant by method acceptable to sealant manufacturer.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect finished Work from damage.

3.9 DEMONSTRATION AND TRAINING

- A. Section 01 79 00 - Demonstration and Training: Provide demonstration and training to the Owner regarding operation and maintenance of components of the installed Work.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes:
 - 1. Mechanical and electrified door hardware for:
 - a. Swinging doors.
 - 2. Electronic access control system components, including:
 - Electronic access control devices.
 - 3. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:
 - 1. Windows
 - 2. Cabinets (casework), including locks in cabinets
 - 3. Signage
 - 4. Toilet accessories
 - 5. Overhead doors
- C. Related Sections:
 - 1. Division 01 Section "Alternates" for alternates affecting this section.
 - 2. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
 - 3. Division 26 sections for connections to electrical power system and for low-voltage wiring.
 - 4. Division 28 sections for coordination with other components of electronic access control system.

1.03 REFERENCES

- A. UL - Underwriters Laboratories
 - 1. UL 10B - Fire Test of Door Assemblies
 - 2. UL 10C - Positive Pressure Test of Fire Door Assemblies
 - 3. UL 1784 - Air Leakage Tests of Door Assemblies

4. UL 305 - Panic Hardware
- B. DHI - Door and Hardware Institute
 1. Sequence and Format for the Hardware Schedule
 2. Recommended Locations for Builders Hardware
 3. Key Systems and Nomenclature
- C. ANSI - American National Standards Institute
 1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties

1.04 SUBMITTALS

- A. General:
 1. Submit in accordance with Conditions of Contract and Division 01 requirements.
 2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
 3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.
- B. Action Submittals:
 1. Product Data: Technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
 3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated, and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
 4. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
 - a. Door Index; include door number, heading number, and Architects hardware set number.
 - b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
 - c. Quantity, type, style, function, size, and finish of each hardware item.
 - d. Name and manufacturer of each item.
 - e. Fastenings and other pertinent information.
 - f. Location of each hardware set cross-referenced to indications on Drawings.
 - g. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - h. Mounting locations for hardware.

- i. Door and frame sizes and materials.
 - j. Name and phone number for local manufacturer's representative for each product.
 - k. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include operational descriptions for: egress, ingress (access), and fire/smoke alarm connections.
 - 1) Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work that is critical in Project construction schedule.
5. Key Schedule:
- a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
 - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
 - 1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
 - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory or shop prepared for door hardware installation.
- C. Informational Submittals:
1. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant.
 2. Product data for electrified door hardware:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 3. Warranty: Special warranty specified in this Section.
- D. Closeout Submittals:
1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Factory order acknowledgement numbers (for warranty and service)
 - d. Name, address, and phone number of local representative for each manufacturer.
 - e. Parts list for each product.
 - f. Final approved hardware schedule, edited to reflect conditions as-installed.
 - g. Final keying schedule
 - h. Copies of floor plans with keying nomenclature

- i. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
- j. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.05 QUALITY ASSURANCE

- A. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
 1. Warehousing Facilities: In Project's vicinity.
 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
 4. Coordination Responsibility: Assist in coordinating installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.
 - a. Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.
- B. Architectural Hardware Consultant Qualifications: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 1. For door hardware, DHI-certified, Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC).
 2. Can provide installation and technical data to Architect and other related subcontractors.
 3. Can inspect and verify components are in working order upon completion of installation.
 4. Capable of producing wiring diagrams.
 5. Capable of coordinating installation of electrified hardware with Architect and electrical engineers.
- C. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- D. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
- E. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
- F. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.
- G. Keying Conference

1. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - d. Requirements for access control.
 - e. Address for delivery of keys.

H. Pre-installation Conference

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
3. Inspect and discuss electrical roughing-in for electrified door hardware.
4. Review sequence of operation for each type of electrified door hardware.
5. Review required testing, inspecting, and certifying procedures.

I. Coordination Conferences:

1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
2. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
 1. Deliver each article of hardware in manufacturer's original packaging.
- C. Project Conditions:
 1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
 2. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- D. Protection and Damage:
 1. Promptly replace products damaged during shipping.
 2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
 3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- E. Deliver keys to Owner by registered mail or overnight package service.

1.07 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.08 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Beginning from date of Substantial Completion, for durations indicated.
 - a. Closers:
 - 1) Mechanical: 30 years.
 - b. Automatic Operators: 2 years.
 - c. Exit Devices:
 - 1) Mechanical: 3 years.
 - 2) Electrified: 1 year.
 - d. Locksets:
 - 1) Mechanical: 10 years.
 - 2) Electrified: 1 year.
 - e. Continuous Hinges: Lifetime warranty.
 - f. Key Blanks: Lifetime
 - 2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

1.09 MAINTENANCE

- A. Maintenance Tools: Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PRODUCTS

2.01 MANUFACTURERS

- A. Approval of manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.

- B. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fasteners

- 1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
 - 2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 - 3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
 - 4. Install hardware with fasteners provided by hardware manufacturer.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
- 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.03 HINGES

A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product: Ives 5BB series.
- 2. Acceptable Manufacturers and Products: Bommer BB series, McKinney TA/T4A series, Stanley FBB Series.

B. Requirements:

- 1. Provide hinges conforming to ANSI/BHMA A156.1.
- 2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
- 3. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
- 4. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
6. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
8. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component.
10. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Aluminum Geared

1. Manufacturers:
 - a. Scheduled Manufacturer: Ives.
 - b. Acceptable Manufacturers: Select, Stanley.
2. Requirements:
 - a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
 - b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
 - c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
 - d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
 - e. On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
 - f. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware.
 - g. Install hinges with fasteners supplied by manufacturer.
 - h. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

- a. Scheduled Manufacturer: Von Duprin EPT-10.
- b. Acceptable Manufacturers: ABH PT1000, Securitron CEPT-10.

- B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.
- C. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 FLUSH BOLTS

A. Manufacturers:

- 1. Scheduled Manufacturer: Ives.
- 2. Acceptable Manufacturers: Burns, Rockwood.

B. Requirements:

- 1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.07 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

- 1. Owner Preferred Manufacturer and Product: Schlage ND series.
- 2. Acceptable Manufacturers and Products: Sargent 11-Line, Corbin-Russwin CL3100 series.

B. Requirements:

- 1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3 hour fire doors.
- 2. Cylinders: Refer to "KEYING" article, herein.
- 3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw. Provide proper latch throw for UL listing at pairs.
- 4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
- 5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
- 6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
- 7. Provide electrified options as scheduled in the hardware sets.
- 8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
 - a. Lever Design: Schlage Sparta.

2.08 AUXILIARY LOCKS

A. Deadlocks:

- 1. Manufacturers and Products:
 - a. Owner Preferred Manufacturer and Product: Schlage L400 series.
 - b. Acceptable Manufacturers and Products: Arrow D series, Corbin-Russwin DL4000 series.

2. Requirements:

- a. Provide mortise deadlock series conforming to ANSI/BHMA A156 and function as specified.
- b. Cylinders: Refer to “KEYING” article, herein.
- c. Provide deadlocks with standard 2-3/4 inches (70 mm) backset. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
- d. Provide manufacturer’s standard strike.

2.09EXIT DEVICES

A. Manufacturers and Products:

1. Owner Preferred Manufacturer and Product: Von Duprin 99/33A series.
2. Acceptable Manufacturers and Products: Detex Advantex Series, Precision APEX 2000 series.

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide flush end caps for exit devices.
7. Provide exit devices with manufacturer’s approved strikes.
8. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
9. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
10. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
11. Provide dogging indicators (CDSI/HDSI) for visible indication of dogging status.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Concealed Vertical Cable Exit Devices: provide cable-actuated concealed vertical latch system in two-point for non-rated or fire rated wood doors up to a 90 minute rating and less bottom latch (LBL) configuration for non-rated or fire rated wood doors up to 20 minute rating. Vertical rods not permitted.
 - a. Cable: Stainless steel with abrasive resistant coating. Conduit and core wire ends snap into latch and center slides without use of tools.
 - b. Wood Door Prep: Maximum 1 inch x 1.1875 inch x 3.875 inches top latch pocket and 1 inch x 1.1875 inch x 5 inches bottom latch pocket which does not require the use of a metal wrap or edge for non-rated or fire rated wood doors up to a 45 minute rating.
 - c. Latchbolts and Blocking Cams: Manufactured from sintered metal low carbon copper-infiltrated steel, with molybdenum disulfide low friction coating.
 - d. Top Latchbolt: Minimum 0.38 inch (10 mm) and greater than 90 degree engagement with strike to prevent door and frame separation under high static load.
 - e. Bottom Latchbolt: Minimum of 0.44 inch (11 mm) engagement with strike.

- f. Product Cycle Life: 1,000,000 cycles.
 - g. Latch Operation: Top and bottom latch operate independently of each other. Top latch fully engages top strike even when bottom latch is compromised. Separate trigger mechanisms not permitted.
 - h. Latch release does not require separate trigger mechanism.
 - i. Cable and latching system characteristics:
 - 1) Installed independently of exit device installation, and capable of functioning on door prior to device and trim installation.
 - 2) Connected to exit device at single point in steel and aluminum doors, and two points for top and bottom latches in wood doors.
 - 3) Bottom latch height adjusted, from single point for steel and aluminum doors and two points for wood doors, after system is installed and connected to exit device, while door is hanging
 - 4) Bottom latch position altered up and down minimum of 2 inches (51 mm) in steel and aluminum doors without additional adjustment. Bottom latch deadlocks in every adjustment position in wood doors.
 - 5) Top and bottom latches in steel and aluminum doors and top latch in wood doors may be removed while door is hanging.
16. Top latch mounting: double or single tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
17. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.10ELECTRIC STRIKES

A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product: Von Duprin 6000 Series.
- 2. Acceptable Manufacturers and Products: Folger Adam 300 Series, HES 1006 Series.

B. Requirements:

- 1. Provide electric strikes designed for use with type of locks shown at each opening.
- 2. Provide electric strikes UL Listed as burglary-resistant.
- 3. Where required, provide electric strikes UL Listed for fire doors and frames.
- 4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.11POWER SUPPLIES

A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product: Schlage/Von Duprin PS900 series.
- 2. Acceptable Manufacturers and Products: Securitron BPS series, Security Door Controls 600 series.

B. Requirements:

- 1. Provide power supplies approved by manufacturer of supplied electrified hardware.
- 2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.

3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
 - a. 12/24 VDC Output, field selectable.
 - b. Class 2 Rated power limited output.
 - c. Universal 120-240 VAC input.
 - d. Low voltage DC, regulated and filtered.
 - e. Polarized connector for distribution boards.
 - f. Fused primary input.
 - g. AC input and DC output monitoring circuit w/LED indicators.
 - h. Cover mounted AC Input indication.
 - i. Tested and certified to meet UL294.
 - j. NEMA 1 enclosure.
 - k. Hinged cover w/lock down screws.
 - l. High voltage protective cover.

2.12CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer: Best.

B. Requirements:

1. Provide interchangeable cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide the following keyway: Match existing.

C. Construction Keying:

1. Replaceable Construction Cores.
 - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - 1) 3 construction control keys
 - 2) 12 construction change (day) keys.
 - b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2.13KEYING

- A. Provide cylinders/cores keyed into Owner's existing factory registered keying system.
- B. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- C. Requirements:
 1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - a. Master Keying system as directed by the Owner.

2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features:
 - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - b. Patent Protection: Keys and blanks protected by one or more utility patent(s).
4. Identification:
 - a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication “Keying Systems and Nomenclature” for identification. Do not provide blind code marks with actual key cuts.
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - c. Stamp cylinders/cores and keys with Owner’s unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with “DO NOT DUPLICATE” along with the “PATENTED” or patent number to enforce the patent protection.
 - d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
5. Quantity: Furnish in the following quantities.
 - a. Change (Day) Keys: 3 per cylinder/core.
 - b. Permanent Control Keys: 3.
 - c. Master Keys: 6.

2.14 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer: Telkee.
2. Acceptable Manufacturers: HPC, Lund.

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.15 KEY MANAGEMENT SOFTWARE

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Best Keystone 600N.
2. Acceptable Manufacturers and Products: Schlage SITEMASTER 200, Corbin-Russwin KeyWizard.

B. Requirements:

1. Software: Provide tracking, issuing, collecting and transferring information regarding keys. Provide customized query, reporting, searching capability, comprehensive location hardware listings, display key holder photos and signature for verification, and provide automatic reminders for maintenance, back-ups and overdue keys.
2. Provide training for Owner's personnel on proper operation and application of key management software.

2.16 DOOR CLOSERS

A. Manufacturers and Products:

1. Owner Preferred Manufacturer and Product: LCN 4010/4110 series.
2. Acceptable Manufacturers and Products: Corbin-Russwin DC8000 series, Sargent 281 series.

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 11/16 inch (17 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.17 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN Senior Swing.
2. Acceptable Manufacturers and Products: Besam Swingmaster MP, Horton 4000LE series.

B. Requirements:

1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.
 - a. Opening: Powered by DC motor working through reduction gears.

- b. Closing: Spring force.
 - c. Manual, hydraulic, or chain drive closers: Not permitted.
 - d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
 - e. Cover: Aluminum.
2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 2 to 30 seconds, and logic terminal to interface with accessories, mats, and sensors.
 3. Provide drop plates, brackets, or adapters for arms as required to suit details.
 4. Provide hard-wired motion sensors and/or actuator switches for operation as specified. Provide weather-resistant actuators at exterior applications.
 5. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.
 6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
 7. Provide units with inputs for smoke evacuation doors, where specified, which allow doors to power open upon fire alarm activation and hold open indefinitely or until fire alarm is reset, presence detector input, which prevents closed door from opening or door that is fully opened from closing, hold open toggle input, which allows remote activation for indefinite hold open and close second time input is activated, vestibule inputs, which allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.18DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Trimco.

B. Requirements:

1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.19 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Trimco.

B. Requirements:

1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes of plates:
 - a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
 - b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
 - c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.20 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers: Glynn-Johnson.
2. Acceptable Manufacturers: Rixson, Sargent.

B. Requirements:

1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

2.21 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Trimco.

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.22 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer: Zero International.
2. Acceptable Manufacturers: National Guard, Reese.

B. Requirements:

1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Size of thresholds:
 - a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
 - b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width
4. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.23 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.24 MAGNETIC HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: LCN.
2. Acceptable Manufacturers: Rixson, Sargent.

B. Requirements:

1. Provide wall or floor mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordinate projection of holder and armature with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Connect magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

2.25 COAT HOOKS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives.
 - 2. Acceptable Manufacturers: Burns, Trimco.
- B. Provide coat hooks as specified.

2.26 FINISHES

- A. Finish: BHMA 626/652 (US26D); except:
 - 1. Hinges at Exterior Doors: BHMA 630 (US32D)
 - 2. Continuous Hinges: BHMA 628 (US28)
 - 3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
 - 4. Protection Plates: BHMA 630 (US32D)
 - 5. Overhead Stops and Holders: BHMA 630 (US32D)
 - 6. Door Closers: Powder Coat to Match
 - 7. Wall Stops: BHMA 630 (US32D)
 - 8. Weatherstripping: Clear Anodized Aluminum
 - 9. Thresholds: Mill Finish Aluminum

EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

- D. Set units level, plumb and true to line and location. Adjust and reinforce 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 according to industry standards.
- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- H. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as indicated in keying section.
- I. Wiring: Coordinate with Division 26, ELECTRICAL sections for:
 - 1. Conduit, junction boxes and wire pulls.
 - 2. Connections to and from power supplies to electrified hardware.
 - 3. Connections to fire/smoke alarm system and smoke evacuation system.
 - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 - 5. Testing and labeling wires with Architect's opening number.
- J. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- K. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- L. Closer/holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- M. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- N. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- O. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- P. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- Q. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- R. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 FIELD QUALITY CONTROL

- A. Engage qualified manufacturer trained representative to perform inspections and to prepare inspection reports.
 - 1. Representative will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.04 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 2. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, Installer's Architectural Hardware Consultant must examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.05 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.06 DOOR HARDWARE SCHEDULE

- A. Hardware items are referenced in the following hardware. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.
- B. Hardware Sets:

HARDWARE SET NO. 01

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112HD	<input type="checkbox"/>	628	IVE
1	EA	ELEC CLASSROOM LOCK	AD-400-CY-70-MTK-SPA-B 4AA	<input type="checkbox"/>	626	SCE
			BATTERY			
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	RAIN DRIP	142AA	<input type="checkbox"/>	AA	ZER
1	EA	GASKETING	188SBK PSA	<input type="checkbox"/>	BK	ZER
1	EA	DOOR SWEEP	8192AA	<input type="checkbox"/>	AA	ZER
1	EA	THRESHOLD	655A-223	<input type="checkbox"/>	A	ZER

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

NEEDS TO HAVE PANIC HARDWARE.

HARDWARE SET NO. 02

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112HD	<input type="checkbox"/>	628	IVE
1	EA	REMOVABLE MULLION	KR4954	<input type="checkbox"/>	689	VON
1	EA	PANIC HARDWARE	LD-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-400-993R-70-MTK-SPA-B-LRX	<input type="checkbox"/>	626	SCE
			4AA BATTERY (PROVIDED BY ACCESS CONTROL SUPPLIER)			
1	EA	MORTISE CYLINDER	1E74		626	BES
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
2	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
2	EA	CUSH SHOE SUPPORT	4110-30		689	LCN
			Provides anchorage for 5th screw used w/Cush Arm			
2	EA	BLADE STOP SPACER	4110-61		689	LCN
			Check Frame Details and remove Blade Stop Spacer if Blade Stop is not used			
1	EA	RAIN DRIP	142AA	<input type="checkbox"/>	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	<input type="checkbox"/>	BK	ZER
1	SET	GASKETING	BY DOOR/FRAME MANUFACTURER			
1	SET	MEETING STILE SEAL	BY DOOR/FRAME MANUFACTURER			
2	EA	DOOR SWEEP	8192AA	<input type="checkbox"/>	AA	ZER
1	EA	THRESHOLD	655A-223	<input type="checkbox"/>	A	ZER

COORDINATE WITH ALL RELATED TRADES.
 ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL
 MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.
 DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.
 DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 03

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112HD	<input type="checkbox"/>	628	IVE
1	EA	REMOVABLE MULLION	KR4954	<input type="checkbox"/>	689	VON
1	EA	PANIC HARDWARE	LD-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-400-993R-70-MTK-SPA-B-LRX	<input type="checkbox"/>	626	SCE
			4AA BATTERY (PROVIDED BY ACCESS CONTROL SUPPLIER)			
1	EA	MORTISE CYLINDER	1E74		626	BES
2	EA	PERMANENT CORE	AS REQUIRED		626	BES
2	EA	SURFACE CLOSER	4111 SCUSH	<input type="checkbox"/>	689	LCN
2	EA	CUSH SHOE SUPPORT	4110-30		689	LCN
			Provides anchorage for 5th screw used w/Cush Arm			
2	EA	BLADE STOP SPACER	4110-61		689	LCN
			Check Frame Details and remove Blade Stop Spacer if Blade Stop is not used			
1	EA	RAIN DRIP	142AA	<input type="checkbox"/>	AA	ZER
1	EA	GASKETING	188SBK PSA	<input type="checkbox"/>	BK	ZER
1	EA	MULLION SEAL	8780NBK PSA	<input type="checkbox"/>	BK	ZER
1	SET	MEETING STILE SEAL	BY DOOR/FRAME MANUFACTURER			
2	EA	DOOR SWEEP	8192AA	<input type="checkbox"/>	AA	ZER
1	EA	THRESHOLD	655A-223	<input type="checkbox"/>	A	ZER

COORDINATE WITH ALL RELATED TRADES.
 ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL
 MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.
 DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.
 DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 03A

Provide each with the following:

HARDWARE SET NO. 03A IS THE SAME AS 03, BUT IS A DOUBLE DOOR INSTEAD OF A SINGLE.

COORDINATE WITH ALL RELATED TRADES.
 ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL
 MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.
 DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.
 DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 04

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	PRIVACY LOCK	ND40S SPA	<input type="checkbox"/>	626	SCH
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

HARDWARE SET NO. 05

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 06

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	STOREROOM LOCK	ND80BDC SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

HARDWARE SET NO. 07

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 08

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	PANIC HARDWARE	9927-EO-LBR	<input type="checkbox"/>	626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-99-EO	<input type="checkbox"/>	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-400-993S-70-MTK-SPA-B-LRX	<input type="checkbox"/>	626	SCE
			4AA BATTERY			
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 SHCUSH	<input type="checkbox"/>	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
2	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK TRIM AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 09

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	MORTISE CYLINDER	1E74		626	BES

HARDWARE SET NO. 10

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 (USE WIDE THROW HINGES SIZED FOR FRAME DIMENSIONS AT 180 DEGREE SWING DOORS)	<input type="checkbox"/>	652	IVE
2	EA	FIRE EXIT HARDWARE	9949-EO-F-LBL	<input type="checkbox"/>	626	VON
2	EA	SURFACE CLOSER	4011	<input type="checkbox"/>	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	<input type="checkbox"/>	630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7850 AS REQ (12/24/120V AC/DC TRI-VOLT)	<input type="checkbox"/>	689	LCN
1	EA	GASKETING	488SBK PSA	<input type="checkbox"/>	BK	ZER
1	EA	ASTRAGAL	BY DOOR/FRAME MANUFACTURER			

DOORS NORMALLY HELD OPEN. UPON LOSS OF POWER OR FIRE ALARM, WALL MAGNETS TO RELEASE AND DOORS WILL CLOSE. DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS

NEEDS TO LOCK ONE WAY INSTEAD OF DOUBLE EGRESS. FREE EGRESS FROM GYM TO CORRIDOR.

HARDWARE SET NO. 11

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 12

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80BD SPA BATTERY OPERATED (PROVIDED BY ACCESS CONTROL SUPPLIER)	<input type="checkbox"/>	626	SCE
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	ARMOR PLATE	8400 36" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

COORDINATE WITH ALL RELATED TRADES.

ENTRY BY CREDENTIAL OR KEY OVERRIDE. PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY UNLOCK LOCK AND ALLOW ENTRY.

DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.

DOOR CONTACT TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

HARDWARE SET NO. 13

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	<input type="checkbox"/>	652	IVE
1	EA	CLASSROOM DEAD LOCK	L463L	<input type="checkbox"/>	626	SCH
1	EA	MORTISE CYLINDER	1E74		626	BES
1	EA	PUSH PLATE	8200 6" X 16"	<input type="checkbox"/>	630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	<input type="checkbox"/>	630	IVE
1	EA	SURFACE CLOSER	4111 EDA (SWING 180 DEGREES @ DOOR 161.3)	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP/HOLDER	WS45/WS45X	<input type="checkbox"/>	626	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

HARDWARE SET NO. 14

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	PUSH PLATE	8200 6" X 16"	<input type="checkbox"/>	630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	<input type="checkbox"/>	630	IVE
1	EA	SURFACE CLOSER	4111 EDA	<input type="checkbox"/>	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	<input type="checkbox"/>	630	IVE
1	EA	WALL STOP	WS406/407CCV	<input type="checkbox"/>	630	IVE
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

HARDWARE SET NO. 15

Provide each with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	<input type="checkbox"/>	652	IVE
1	EA	CLASSROOM LOCK	ND70BD SPA	<input type="checkbox"/>	626	SCH
1	EA	PERMANENT CORE	AS REQUIRED		626	BES
1	EA	OH STOP	90S	<input type="checkbox"/>	630	GLY
3	EA	SILENCER	SR64	<input type="checkbox"/>	GRY	IVE

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Glass glazing materials and installation requirements are included in this Section for frame assemblies specified in other Sections.
- B. Related Requirements:
 - 1. Section 07 90 00 - Joint Protection: Sealant and back-up material other than glazing sealants.
 - 2. Section 08 11 13 - Hollow Metal Doors and Frames: Doors and frames to receive glazing in this Section.
 - 3. Section 08 14 16 - Flush Wood Doors: Doors to receive glazing in this Section.
 - 4. Section 08 17 43 - Integrated Composite Door Opening Assemblies: Doors to receive glazing in this Section.
 - 5. Section 08 41 13 - Aluminum-Framed Entrances and Storefronts: Framing system to receive glazing in this Section.
 - 6. Section 08 44 13 - Glazed Aluminum Curtain Walls: Framing system to receive glazing in this Section.
 - 7. Section 10 28 00 - Toilet Accessories: Glazing for metal framed mirrors specified in this Section.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI Z97.1 - Safety Glazing Materials Used in Buildings Safety.
- B. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- C. ASTM International (ASTM):
 - 1. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2015).
 - 2. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
 - 3. ASTM C1036 - Standard Specification for Flat Glass; 2011.
 - 4. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass; 2012.
 - 5. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
 - 6. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
 - 7. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
 - 8. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.
 - 9. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
 - 10. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- D. Consumer Products Safety Commission (CPSC); Code of Federal Regulations (CFR):
 - 1. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing.

- E. Glass Association of North America (GANA):
 - 1. GANA (GM) - GANA Glazing Manual; 2009.
 - 2. GANA (SM) - GANA Sealant Manual; 2008.
 - 3. GANA (LGRM) - Laminated Glazing Reference Manual; 2009.
- F. National Fenestration Rating Council Incorporated (NFRC):
 - 1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors.
 - 2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
 - 3. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.
- G. National Fire Protection Association (NFPA):
 - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
 - 2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
 - 3. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies.
- H. Underwriters Laboratories Inc. (UL):
 - 1. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
 - 2. UL - Building Materials Directory.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
 - 1. Glass: Provide structural, physical, and environmental characteristics, size limitations, special handling, or installation requirements. Include manufacturer's full range of samples of glass tinting options for Architects selection.
 - 2. Glazing Sealants, Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify full range of available colors.
- C. Shop Drawings:
 - 1. Indicate sizes, layout, thicknesses, and loading conditions for glass.
- D. Samples:
 - 1. Glass: Submit two samples, 12 x 12 inches in size, of each glass type.
 - 2. Glazing Units: Submit two samples, 12 x 12 inches size, of assembled sealed insulating glazing units.
 - 3. Glazing Materials: Submit 12 inch long bead of glazing sealant and gaskets, color as selected.
- E. Design Data: Submit design calculations for resistance of wind loads for glass and glazing units.
- F. Manufacturer's Certificate: Certify sealed insulating glass units meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following standards:
 - 1. GANA (GM) - GANA Glazing Manual; 2009.
 - 2. GANA (SM) - GANA Sealant Manual; 2008.
 - 3. GANA (LGRM) - Laminated Glazing Reference Manual; 2009.
 - 4. Maintain one copy of each document on site.
- B. Fire Rated Door Glazing: Tested in accordance with one of the following and complying with NFPA 80.

1. NFPA 252; with neutral pressure level at 40 inches maximum above sill at 5 minutes into test.
 2. UL 10C.
 3. Maintain one copy of each document on site.
- C. Apply label from agency approved by authority having jurisdiction to identify each fire rated glass lite.
- D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum five (5) years of documented experience.
- E. Fabricator Qualifications: Fabricator certified by glass manufacturer for type of glass, glass unit, coating, and treatment involved and capable of providing requirements indicated in this Section.
- F. Installer Qualifications: Company specializing in performing work of this Section with minimum five (5) years of documented experience.

1.5 PRE-INSTALLATION MEETING

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week before starting Work of this Section; require attendance by all affected installers.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Do not install glazing when ambient temperature is less than 50 degrees F.
- C. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Sealed Insulating Glass Units: Provide a ten (10) year warranty to include coverage for seal failure, interpane dusting, condensation or misting, and replacement of failed units.
- C. Laminated Glass: Provide a ten (10) year warranty to include coverage for delamination, including replacement of failed units.
- D. Spandrel Glass: Provide a five (5) year warranty to include coverage for deterioration of spandrel glass coating, including replacement of failed units.

1.8 EXTRA MATERIALS

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts, and maintenance products.
- B. Extra Insulating Glass Units: One (1) percent (minimum of one) of each type and size.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide glazing and glazing assemblies of type and thickness to support assembly dead loads and to withstand live loads caused by positive and negative wind pressure acting normal to

plane of glass. Comply with the State Building Code for the State in which the project is located.

1. Wind Loads: Design and size glazing and glazing assemblies to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall, including increased wind loads at building corners.
 - a. Design glass and glass assemblies in accordance with ASCE 7 - Calculation of Wind Loads, as measured in accordance with ASTM E330.
 - b. Comply with Design Loads indicated on Drawings and applicable code requirements based on geographical location.
 - c. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 2. Seismic Loads: Design and size components and system to withstand seismic loads and sway displacement as calculated in accordance with ASCE 7 and applicable code requirements.
 3. Exterior Glass Deflection: Maximum of 1/175 of glass edge length or 3/4 inch, whichever is less with full recovery of glazing materials.
 4. Interior Glass Deflection: Maximum thickness of glass differential deflection for two adjacent unsupported edges when 50 plf force is applied to one panel at any point up to 42 inches above finished floor.
 5. Glass thickness listed in this Section and on Drawings is minimum. Actual thickness to be as required by design to comply with performance requirements.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
1. In conjunction with vapor retarder and joint sealer materials described in other Sections.
 2. To utilize the inner pane of multiple pane insulating glass units for the continuity of the vapor retarder and air barrier seal.
 3. To maintain a continuous vapor retarder and air barrier throughout the glazed assembly from glass pane to heel bead of glazing sealant.
- C. Thermal and Solar Optical Performance: Measured or calculated in accordance with the following:
1. U-Values: NFRC 100.
 2. Solar Heat Gain Coefficients: NFRC 200.
 3. Solar Optical Properties: NFRC 300.

2.2 GLASS MATERIALS

- A. Float Glass: Provide float glass-based glazing unless noted otherwise.
1. Annealed Glass: ASTM C1036, Type I (transparent flat), Class 1 (clear), Quality-Q3.
 2. Heat-Treated Glass:
 - a. Heat-Strengthened Glass: ASTM C1048, Kind HS.
 - b. Fully Tempered Safety Glass: ASTM C1048, Kind FT; ANSI Z97.1 and 16 CFR 1201, Category I or II (size dependent).
 3. Tinted Glass: ASTM C1036, Type 1 (transparent flat), Class 2 (tinted), Quality-Q3, color and performance characteristics as indicated.
 4. Glass Lite Thicknesses: As indicated, but not less than 1/4 inch; provide greater thickness as required for exterior glazing wind load design.
- B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass:
 - a. Complies with ANSI Z97.1 - Class A and 16 CFR 1201 - Category II impact test requirements.
 2. Interlayer: Polyvinyl Butyral (PVB) Interlayer; 0.030 inch thick, minimum.

2.3 INSULATING GLASS UNITS - GENERAL

- A. Glass Manufacturers must meet performance requirements indicated in this Section.
- B. Glass Manufacturers:
 - 1. Guardian Industries Corporation. (Basis of Design)
 - 2. Cardinal Glass Industries.
 - 3. Pilkington North America Inc.
 - 4. PPG Industries, Inc.
 - 5. Viracon, Apogee Enterprises, Inc.
 - 6. Substitutions: Section 01 60 00 - Product Requirements.
- C. Fabricators:
 - 1. Fabricator certified by glass manufacturer for type of glass, glass unit, coating, and treatment involved and capable of providing requirements indicated in this Section.
- D. Insulating Glass Units: Types as indicated.
 - 1. Factory assembled units consisting of continuously sealed lites of glass separated by an aluminum (or stainless steel) spacer with sealants.
 - 2. Overall Unit Thickness: Dependent on assembled unit components.
 - 3. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 4. Metal Edge Spacers:
 - a. Aluminum, mitered and spigoted.
 - 1) Desiccant: Molecular sieve or silica gel, or blend of both.
 - 5. Edge Seal: Dual Seal - Glass to elastomer with supplementary silicone sealant.
 - 6. Interpane Air Space: 1/2 inch, unless indicated otherwise in Schedule of IGU Types.
 - a. Purge interpane air space with dehydrated air, hermetically sealed.
 - b. Use Argon in lieu of Dehydrated Air only if indicated in Schedule of IGU Types.
 - 7. Primary IGU Seal:
 - a. The primary IGU sealant must be fully wetted against the glass and be continuous around the perimeter of each side with a targeted width of 5/32 inch and a minimum width of 3/32 inch.
 - b. The minimum thickness of the primary seal after pressing is 1/16 inch.

2.4 SCHEDULE - INSULATING GLASS UNIT TYPES

- A. **Type IG1:** Low-e Coated and Clear Insulating Glass Unit:
 - 1. Overall Unit Thickness: 1 inch (25 mm).
 - 2. Minimum Thickness of Each Glass Lite: 1/4 inch (6 mm).
 - 3. Outboard Lite: Clear float glass, ASTM C1036, Type 1, Class 1, Quality Q3.
 - a. Basis of Design: Guardian SunGuard SN 54.
 - b. Low-E Coating: Vacuum Deposition Sputtered Coating on second surface, ASTM C1376.
 - c. Heat-Treatment: Heat-Strengthened as required to comply with performance requirements. Fully Tempered glass where safety glass is required by Code and where indicated on Drawings. ASTM C1048.
 - 4. Interspace Content: Air, 1/2 inch (12mm) wide, hermetically sealed, dehydrated space.
 - 5. Inboard Lite: Clear float glass, ASTM C1036, Type 1, Class 1, Quality Q3.
 - a. Heat-Treatment: Heat-Strengthened as required to comply with performance requirements. Fully Tempered glass where safety glass is required by Code and where indicated on Drawings. ASTM C1048.
 - 6. Provide labeling where safety glazing labeling is required.
- B. **Type IG2:** Low-e Coated and Translucent Insulating Glass Unit:

1. Overall Unit Thickness: 1 inch (25 mm).
 2. Minimum Thickness of Each Glass Lite: 1/4 inch (6 mm).
 3. Outboard Lite: Clear float glass, ASTM C1036, Type 1, Class 1, Quality Q3.
 - a. Basis of Design: Guardian SunGuard SN 54.
 - b. Low-E Coating: Vacuum Deposition Sputtered Coating on second surface, ASTM C1376.
 - c. Heat-Treatment: Heat-Strengthened as required to comply with performance requirements. Fully Tempered glass where safety glass is required by Code and where indicated on Drawings. ASTM C1048.
 4. Interspace Content: Air, 1/2 inch (12mm) wide, hermetically sealed, dehydrated space.
 5. Inboard Lite: Acid-etched Clear float glass.
 - a. Basis of Design Product: Guardian SatinDeco.
 - b. Finish: Acid-etched texture on third surface.
 - c. Heat-Treatment: Heat-Strengthened as required to comply with performance requirements. Fully Tempered glass where safety glass is required by Code and where indicated on Drawings. ASTM C1048.
 6. Provide labeling where safety glazing labeling is required.
- C. **Type IG3:** Low-e Coated, Tinted and Tempered Insulating Glass Unit:
1. Overall Unit Thickness: 1 inch (25 mm).
 2. Minimum Thickness of Each Glass Lite: 1/4 inch (6 mm).
 3. Outboard Lite: Tinted float glass, ASTM C1036, Type 1, Class 2, Quality Q3.
 - a. Basis of Design: Guardian SunGuard SN 54.
 - b. Color: To be selected by Architect from manufacturer's full range of colors and finishes.
 - c. Low-E Coating: Vacuum Deposition Sputtered Coating on second surface, ASTM C1376.
 - d. Heat-Treatment: Fully Tempered glass. ASTM C1048.
 4. Interspace Content: Air, 1/2 inch (12mm) wide, hermetically sealed, dehydrated space.
 5. Inboard Lite: Clear float glass, ASTM C1036, Type 1, Class 1, Quality Q3.
 - a. Heat-Treatment: Fully Tempered glass. ASTM C1048.
 6. Provide labeling where safety glazing labeling is required.

2.5 SCHEDULE - SINGLE LITE GLASS UNIT TYPES

- A. **Type FG:** Interior Single Lite - Vision Glass.
1. Applications: Interior glazing unless otherwise indicated.
 2. Glass Type: Annealed float glass.
 3. Tint: Clear.
 4. Total Thickness: 1/4 inch.
- B. **Type SG:** Interior Single Lite - Safety Glass; Non-fire-rated.
1. Application: Locations as follows.
 - a. Glazed lites in doors, except fire doors.
 - b. Glazed sidelights to doors, except in fire-rated walls and partitions.
 - c. Other locations required by applicable federal, state, and local codes and regulations.
 - d. Other locations indicated on the Drawings.
 2. Glass Type: Fully Tempered (Kind FT) float glass.
 3. Tint: Match adjacent glass.
 4. Thickness: 1/4 inch.
- C. **Type SGO:** Same as Type SG, but opaque finish.

1. Color: To be selected by Architect from manufacturer's full range of colors and finishes.
- D. **Type LG:** Interior Single Lite - Safety Glass, Laminated.
1. Application: Locations indicated on Drawings.
 2. Glass Type: Laminated safety glass.
 3. Tint: Clear.
 4. Coating: None.
 5. Total Thickness: 1/4 inch.

2.6 GLAZING COMPOUNDS

- A. All materials to be approved by manufacturers of products to which glazing compounds are to be applied.
- B. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- C. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; Black color.
- D. Structural Sealant Glazing (SSG) Adhesive: Structural silicone type as approved by both the metal framing system manufacturer and glass panels manufacturer.

2.7 ACCESSORIES

- A. All accessories to be approved by manufacturers of products to which accessories are to be applied.
- B. Setting Blocks: Neoprene, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inches x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- C. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inches long x one half the height of the glazing stop x thickness to suit application, self-adhesive on one face.
- D. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
 1. Width: As required for application.
 2. Thickness: As required for application.
- E. Spacer Rod Diameter: As required for application.
- F. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.
- G. Fire-Resistant Glazing Materials: Materials used to obtain required fire-resistant rating.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

- C. Verify that the minimum required face and edge clearances are being provided.
- D. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- E. Verify that sealing between joints of framing system members has been completed effectively.
- F. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.
- B. Prepare materials to be installed and equipment used during installation.
- C. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- D. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- E. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.3 INSTALLATION - GENERAL

- A. Perform installation in accordance with GANA Glazing Manual.
 - 1. Glazing Sealants: Comply with ASTM C1193.
 - 2. Fire Rated Openings: Comply with NFPA 80.
- B. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- C. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- D. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- E. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- F. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- G. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.4 INSTALLATION METHODS

- A. Utilize installation method required by manufacturer and glazing system design.
- B. Dry Glazing Method (Gasket Glazing):
 - 1. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
 - 2. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
 - 3. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
 - 4. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

- C. Dry Glazing Method (Tape and Gasket Spline Glazing):
 - 1. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
 - 2. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
 - 3. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
 - 4. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
 - 5. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
 - 6. Carefully trim protruding tape with knife.
- D. Dry Glazing Method (Tape and Tape):
 - 1. Application - Interior Glazed: Set glazing infills from the interior of the building.
 - 2. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
 - 3. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
 - 4. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
 - 5. Place glazing tape on free perimeter of glazing in same manner described above.
 - 6. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
 - 7. Carefully trim protruding tape with knife.
- E. Installation - Wet Glazing Method (Compound and Compound):
 - 1. Application - Interior Glazed: Set glazing infills from the interior of the building.
 - 2. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 24 inches centers, kept 1/4 inch below sight line.
 - 3. Locate and secure glazing pane using glazers' clips.
 - 4. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.
- F. Installation - Wet/Dry Glazing Method (Preformed Tape and Sealant):
 - 1. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
 - 2. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.
 - 3. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
 - 4. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
 - 5. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
 - 6. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.
 - a. Place glazing tape on glazing pane of unit with tape flush with sight line.
 - 7. Fill gap between glazing and stop with glazing manufacturer's required sealant type to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.
 - 8. Apply cap bead of glazing manufacturer's required sealant type along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Monitor quality of installation, inspection, and testing.

- B. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- C. Monitor and report installation procedures and unacceptable conditions.

3.6 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- C. Remove non-permanent labels immediately after glazing installation is complete.
- D. Clean glass and adjacent surfaces after sealants are fully cured.
- E. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed construction from damage.

3.8 SCHEDULE

- A. Refer to Drawings for locations of Glass Unit Types.

END OF SECTION

SECTION 08 83 00

MIRRORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Frameless glass mirrors, for wall mounted installation.
 - 2. Does not include Framed Mirrors as specified in Section 10 28 00 - Toilet Accessories.
- B. Related Requirements:
 - 1. Section 04 20 00 - Unit Masonry: For mirrors installed on masonry wall construction.
 - 2. Section 09 21 16 - Gypsum Board Assemblies: For mirrors installed on gypsum wall construction.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM C1036 - Standard Specification for Flat Glass.
 - 2. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.
 - 3. ASTM C1193 - Standard Guide for Use of Joint Sealants.
- B. Glass Association of North America:
 - 1. GANA - FGMA Sealant Manual.
 - 2. GANA - Glazing Manual.
- C. Underwriters Laboratories Inc. (UL):
 - 1. UL (Dir) - Online Certifications Directory; current edition.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
 - 1. Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
 - 2. Glazing Materials: Submit chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- C. Shop Drawings: Indicate fabrication and installation details including installation layout and adjacent construction elements.
- D. Manufacturer's Certificate: Certify mirrors meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for mirror installation methods.
- B. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in performing Work of this section with minimum five (5) years documented experience.

- B. Installer: Company specializing in performing Work of this section with minimum five (5) years documented experience.
- C. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing film and substrates on which mirrors are installed.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Do not install glazing when ambient temperature is less than 50 degrees F.
- C. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing sealants.

1.7 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Furnish two (2) year warranty to include coverage for reflective coating on mirrors and replacement of same.

PART 2 PRODUCTS

2.1 FRAMELESS GLASS MIRRORS

- A. Components:
 - 1. Laminated Safety Mirror Glass: ASTM C1172, Kind LM laminated mirror glass, ASTM C1036 Type 1 transparent flat, Class 1 clear, Quality Q1 mirror select.
 - a. Edge Treatment:
 - 1) Flat Polished/Ground.
 - b. Edge Seal: Seal edge after edge treatment to prevent chemical or atmospheric penetration of backing.
 - c. Perform edge treatment and sealing in factory immediately after cutting to final sizes.
 - d. Thickness: Nominal total of 1/4 inch, unless otherwise indicated.
 - e. Size: Sizes noted on Drawings.
- B. Accessories:
 - 1. Mirror Adhesive: Chemically compatible with mirror coating and wall substrate.
- C. Mirror Hardware:
 - 1. Metal J-Channels: Fabricated with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
 - a. Metal:
 - 1) Stainless steel.
 - b. Finish:
 - 1) Bright polished.
 - c. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.05 inch.
 - d. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.062 inch.
 - 2. Fasteners: Fabricated of same metal and alloy as fastened metal. Finish to match fastened metal in finished color and texture where fasteners are exposed.

3. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify openings for mirrored glazing are correctly sized and within tolerance.
- C. Verify surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive mirrors.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Frameless Glass Mirrors: Secured to wall substrate wall construction.
 1. Perform installation in accordance with GANA Glazing Manual.
 - a. Glazing Sealants: Comply with ASTM C1193.
 - b. Set mirrors plumb and level, free of optical distortion.
 - 1) Mirrors shall be butt mounted to unpainted wall with mastic to comply with manufacturer's recommendations
 - c. Set mirrors with edge clearance free of surrounding construction.
 2. Clean contact surfaces with solvent and wipe dry.
 3. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
 4. Prime surfaces scheduled to receive sealant.
 5. For wall-mounted mirrors, install mirrors with mastic and mirror hardware.
 - a. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
 - b. For mirror hardware in the form of a continuous J-channel at bottom and continuous top trim at top, fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.
 - c. Install mastic as follows:
 - 1) Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
 - d. Place plumb and level without visible distortion.

3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Remove labels after Work is complete.
- C. Clean mirrors and adjacent surfaces.

- D. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protect installed construction.
- B. Protect the Work for damage.

3.6 SCHEDULE

- A. Trophy Case: Continuous on rear wall; interrupted by vertical space for shelving supports.
- B. Where indicated on the drawings.

END OF SECTION

SECTION 08 91 00

LOUVERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes louvers, frames, and accessories.
- B. Related Requirements:
 - 1. Section 07 90 00 - Joint Protection: Sealant at louver perimeter.
 - 2. Division 23 - Heating, Ventilating and Air-Conditioning (HVAC): Coordinate Work of this Section with requirements of HVAC systems.

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
 - 2. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.
- B. Air Movement and Control Association International, Inc. (AMCA):
 - 1. AMCA 500- L - Laboratory Methods of Testing Louvers for Rating, 2015.
 - 2. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices, 2010.
- C. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7-10 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Current Addition.
- D. ASTM International (ASTM):
 - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blank-off panel areas required, and frames.
- D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selection.
- E. Samples for Verification: From the Architect's initial selection, prepare two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with AMCA Certification for Water Penetration, Air Performance, and Wind Driven Rain, in compliance with AMCA 500-L. Attach AMCA seal to louvers.
- B. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years documented experience.

1.6 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with installation of masonry flashings.
- C. Coordinate Work with installation of mechanical ductwork and electrical services to motorized devices.
- D. Coordinate air-flow rate and capacity to comply with the design requirements indicated in the contract documents.

1.8 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Provide minimum fifteen (15) year manufacturer's warranty on finish.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Design systems and size system components and anchorage to safely withstand Live Loads, Dead Loads and Wind Loads as indicated on Drawings for the Structural Design and in accordance with ASCE 7-10 and in compliance with the State Building Code for the State in which the project is located.
- B. Louver Air Passage: To permit passage of air at velocity of 750 ft / min without blade vibration or noise, with maximum static pressure loss of 0.10 inches measured at 750 ft / min.
- C. Louver Free Area: To permit 50 percent free area.
- D. Louver Water Penetration: Not more than 0.01 oz/sq ft of free area at minimum 750 ft / min face velocity.

2.2 WALL LOUVERS

- A. Manufacturers:
 - 1. Construction Specialties Inc.
 - 2. Airline Products Co.

3. Airolite.
 4. Arrow United Industries.
 5. Greenheck Corp.
 6. Ruskin.
- B. Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
- C. Louver Construction: Extruded aluminum; size, configuration and face dimensions as indicated on Drawings.
- D. Louver Panel Depth: Minimum 5 inches deep, or deeper if required by size and performance requirements.
- E. Heads, sills, jambs, and mullions to be one-piece structural aluminum extrusion members; minimum extrusion wall thickness to be 0.081 inch and with integral perimeter formed with sealant slot and retaining bead to retain backer rod for sealant application.
1. Intermediate Mullions: Concealed of extruded aluminum, profiled to suit louver frame.
- F. Louver Blades: Drainable blades to be one-piece aluminum extrusions; minimum extrusion wall thickness to be 0.060 inch and with integral front lip gutter and multiple secondary gutters designed to stop and drain moisture to exterior of building envelope.
1. Storm proof, sloped at 45 degrees, chevron style.
- G. Sill Pan: Sill flashings to include sill pan, minimum 3 inch high by full depth formed from minimum 0.050 inch thick aluminum; single length one-piece construction; integral formed drip edge to divert moisture away from building face. End dam side panels to be continuous welded to sill pan and full height of sill pan.
- H. Hinged Units: Where indicated on Drawings, provide secondary frame to which louver frame is attached; non-ferrous hinges; all finishes to match colors selected by Architect.

2.3 MATERIALS

- A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper typical, 6061 alloy, T6 temper for extruded structural members.
- B. Sheet Aluminum: ASTM B209, 5005 alloy, H15 or H34 temper, wall thickness as required for system application and use but not less than 0.050 inch.

2.4 ACCESSORIES

- A. Screens: Mechanically fasten to interior side of louver
1. Bird Screen: Interwoven wire mesh of aluminum, 0.063 inch diameter wire, 1/2 inch open weave, square design, set in aluminum frame.
 2. Insect Screen: 18 x 16 size aluminum mesh, set in aluminum frame.
- B. Blank-Off Panels: Furnish where indicated on the Drawings; fabricated by the louver manufacturer; metal type to be same as louver and frame metal type; metal finish type to be same as louver finish type.
1. Panel Type:
 - a. Composite Metal Sheet Panel: Blank-off panels to be composite construction faced on both sides with 0.032 inch (0.81 mm) thick metal sheet and core to be expanded polystyrene (EPS) having R-value of 4, minimum. Panel perimeter frame to be 0.050 inch (1.27mm) thick-formed metal channels; mitered at the corners.
 - 1) Composite Panel Thickness:
 - a) 2 inches.

2. Secure blank-off panels to interior side of louver and fully sealed weathertight.
 3. Blank-Off Panels Finish: In accordance with AAMA 2605, 70 percent resin fluoropolymer coating, minimum 1.4 mil (0.035mm) thick; color to be flat black.
- C. Fasteners and Anchors: Concealed; stainless steel type.
- D. Flashings: Sheet aluminum; finish to match louver finish.
- E. Sealants: Silicone type specified in Section 07 90 00.

2.5 FACTORY FINISHING

- A. Powder Coat: Polyvinylidene fluoride (PVDF) powder coat system complying with AAMA 2605, minimum 70 percent PVDF resin with minimum total dry film thickness (DFT) of 1.5 mils, 0.0015 inch (0.038 mm).
- B. Colors and Gloss: As selected by Architect from full range of finish types.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify prepared openings and flashings are ready to receive Work and opening dimensions are as indicated on shop drawings.

3.2 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Provide continuous corrosion protection between dissimilar materials.
- C. Louver systems, including sill flashings, to be installed in accordance with Drawings the manufacturer's recommendations and to shed water to exterior of building envelope.
- D. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior of building envelope.
- E. Sill pan to be embedded in full bed of sealant. Design system such that penetrations in flashings and sill pan are only for the purpose of structural anchoring of louver system.
- F. Fully seal anchor holes and heads to prevent water penetration.
- G. Install louvers level and plumb.
- H. Secure louvers in opening framing with concealed fasteners.
- I. Install bird and insect screen and frame to interior of louver.
- J. Install perimeter sealant and backing rod in accordance with Section 07 90 00.

3.3 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. In accordance with manufacturer's recommendations, strip protective finish coverings and clean surfaces and components.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior Gypsum Board.
 - 2. Exterior Gypsum Board.
 - 3. Framing.
 - 4. Suspension Support.
 - 5. Acoustic Attenuation.
 - 6. Accessories.

- B. Related Requirements:
 - 1. Section 01 33 00 – Submittal Procedures: Delegated-Design Services.
 - 2. Section 05 40 00 - Cold-Formed Metal Framing.
 - 3. Section 06 10 53 - Miscellaneous Rough Carpentry: Wood blocking for support of wall cabinets, toilet accessories and other wall mounted Work.
 - 4. Section 07 21 00 - Thermal Insulation: Insulation for gypsum board assemblies requiring thermal insulation.
 - 5. Section 07 90 00 - Joint Protection.
 - 6. Section 09 30 00 - Tiling: Tile Backer Board to be installed on framing provided in this Section.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy- Coated (Galvannealed) by the Hot-Dip Process; 2017.
 - 2. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members, 2015.
 - 3. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes, 2014.
 - 4. ASTM C219 - Standard Terminology Relating to Hydraulic and Other Inorganic Cements; 2020.
 - 5. ASTM C303 - Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation; 2017.
 - 6. ASTM C473 - Standard Test Methods for Physical Testing of Gypsum Panel Products 2016.
 - 7. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017.
 - 8. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2017.
 - 9. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
 - 10. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
 - 11. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.
 - 12. ASTM C834 - Standard Specification for Latex Sealants; 2017.

13. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2020.
 14. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2018.
 15. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2018.
 16. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.
 17. ASTM C1104/C1104M - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation; 2013.
 18. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base, 2014.
 19. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
 20. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2013.
 21. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2014.
 22. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
 23. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels. 2015.
 24. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
 25. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017.
 26. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
 27. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C, 2016.
 28. ASTM E970 - Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source; 2017.
 29. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- B. Gypsum Association:
1. GA-214 - Recommended Levels of Gypsum Board Finish; 2010.
 2. GA-216 - Application and Finishing of Gypsum Panel Products; 2016.
 3. GA-600 - Fire Resistance Design Manual Sound Control; 2012.
- C. International Organization for Standardization (ISO):
1. ISO 11600 - Building Construction - Jointing Products - Classification and Requirements For Sealants; 2002 with 2011 Amendments.
- D. Intertek Testing Services (Warnock Hersey Listed):
1. WH - Certification Listings.
- E. Underwriters Laboratories Inc.:
1. UL - Fire Resistance Directory.
- F. California Department of Health Services:
1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on metal framing; gypsum board and sheathing; joint treatment materials; and acoustic accessories.
- C. Shop Drawings: Indicate special details associated with fireproofing and acoustic accessories.
 - 1. Show type, weight, location, and spacing of members. Clearly identify attachments and connections using AWS symbols for welds, standard designations for fasteners. Show bracing, supplemental strapping, clips, and other accessories required.
 - 2. Delegated Engineering Design: Shop drawings shall be sealed by a licensed Professional Structural Engineer registered in the State in which the project is located and shall include structural calculations verifying compliance with the performance data specified and as noted on the building code data sheet of the drawings. It is the responsibility of such engineer that all provisions of the State Building Code, for the State in which the Work will be constructed, shall be met. Verify and coordinate stud depth with the partition schedule on the architectural drawings. Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related Work. Show type, weight, location, and spacing of members. Clearly identify attachments and connections using AWS symbols for welds, standard designations for fasteners. Show bracing, supplemental strapping, clips, and other accessories required.
- D. Samples:
 - 1. Submit two sets of each item indicated in ACCESSORIES article in this Section, illustrating manufacturer's full range of options. Submit for selection by Architect.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three (3) years documented experience.
- C. Delegated Engineering Design: Design all metal stud and cold rolled steel framing using the engineering services of a Professional Structural Engineer experienced in design of this Work and licensed to perform professional engineering services in the State in which the project is located.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Refer to Part 3, INSTALLATION - GENERAL of this Section.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E19 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
- C. Fire Rated Wall Construction: Wall assembly fire rating to be as indicated on Drawings and as required by building code.

2.2 MANUFACTURERS

- A. CertainTeed Corporation (CT).
- B. Georgia-Pacific Gypsum Corporation (GPG).
- C. National Gypsum Company (NGC).
- D. USG Corporation (USG).
- E. Substitutions: Section 01 60 00 - Product Requirements.

2.3 INTERIOR GYPSUM BOARD MATERIAL

- A. Standard Gypsum Board: ASTM C1396/C1396M; 5/8 inch thick; maximum available length in place; ends square cut; tapered edges; suitable for finish and paint.
 - 1. Type X fire resistant complying with requirements of ASTM C1396/C1396M.
 - 2. Combustibility: Noncombustible complying with ASTM E136.
 - 3. Surface Burning Characteristics: When tested in accordance with ASTM E84.
 - a. Flame Spread: 15 maximum.
 - b. Smoke Development: Zero.
 - c. Class: Class A.
 - 4. Basis of Design:
 - a. USG - Sheetrock Firecode X.
 - 5. Locations: All interior locations where other gypsum board type is not indicated.
- B. Moisture and Mold Resistant Gypsum Board: ASTM C1396/C1396M; 5/8 inch thick; maximum available length in place; ends square cut; tapered edges; suitable for finish and paint.
 - 1. Type X fire resistant complying with requirements of ASTM C1396/C1396M.
 - 2. Combustibility: Noncombustible complying with ASTM E136.
 - 3. Surface Burning Characteristics: When tested in accordance with ASTM E84.
 - a. Flame Spread: 15 maximum.
 - b. Smoke Development: Zero.
 - c. Class: Class A.
 - 4. Water Absorption: 5 percent maximum by weight after two-hour immersion when tested per ASTM C473.
 - 5. Mold Resistance: Score of 10 minimum, per ASTM D3273 for mold growth on interior coatings surface.
 - 6. Basis of Design:
 - a. USG - Sheetrock Glass-Mat Mold Tough Firecode X.
 - 7. Locations: As follows unless indicated otherwise on Drawings.
 - a. Wet Areas: Includes all gypsum surfaces such as walls, ceilings, and bulkheads.
 - b. Toilets and Drinking Fountain Areas: Includes all gypsum surfaces such as walls, ceilings, and bulkheads.
 - c. Kitchen, Dish Washing and Serving Areas: Includes all gypsum surfaces such as walls, ceilings, and bulkheads.
 - d. Walls With Sink(s): Entire wall length and minimum height from finish floor to 8 feet high above finish floor unless otherwise indicated on Drawings.
 - e. Janitor And Custodian Closets: Includes all gypsum surfaces such as walls, ceilings, and bulkheads.
- C. Abuse Resistant Gypsum Board: ASTM C1629/C1629M, abuse resistant; 5/8 inch thick; maximum available length in place; ends square cut; tapered edges; suitable for finish and paint.
 - 1. Type X fire resistant complying with requirements of ASTM C1396/C1396M.
 - 2. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.

3. Combustibility: Noncombustible complying with ASTM E136.
4. Surface Burning Characteristics: When tested in accordance with ASTM E84.
 - a. Flame Spread: 15 maximum.
 - b. Smoke Development: 5 maximum.
 - c. Class: Class A.
5. Basis of Design:
 - a. USG - Sheetrock AR Firecode X Interior Panels.
 - 1) Surface Abrasion: Level 2 minimum, per ASTM C1629/C1629M.
 - 2) Indentation: Level 1 minimum, per ASTM C1629/C1629M.
 - 3) Soft Body Impact: Level 2 minimum, per ASTM C1629/C1629M.
 - 4) Hard Body Impact: Level 1 minimum, per ASTM C1629/C1629M.
6. Locations: As follows unless indicated otherwise on Drawings.
 - a. All classrooms and rooms of instruction and teaching; minimum height from finish floor to 8 feet above finish floor unless otherwise indicated on Drawings.
 - b. Media Center; minimum height from finish floor to 8 feet above finish floor unless otherwise indicated on Drawings.
 - c. All circulation areas, corridors, and passageways; minimum height from finish floor to 8 feet above finish floor unless otherwise indicated on Drawings.

2.4 EXTERIOR GYPSUM BOARD MATERIAL

- A. Exterior Gypsum Sheathing Board: 5/8 inch thick; maximum available size in place; ends square cut; square edges
 1. Type X fire resistant complying with requirements of ASTM C1396/C1396M.
 2. Combustibility: Noncombustible complying with ASTM E136.
 3. Surface Burning Characteristics: When tested in accordance with ASTM E84.
 - a. Flame Spread: Zero.
 - b. Smoke Development: Zero.
 - c. Class: Class A.
 4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 5. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
 6. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 7. Basis of Design:
 - a. USG - Securock Glass-Mat Sheathing Firecode X.
- B. Exterior Gypsum Soffit Board: 5/8 inch thick; maximum available length in place; ends square cut; tapered edges; suitable for finish and paint.
 1. Type X fire resistant complying with requirements of ASTM C1396/C1396M.
 2. Combustibility: Noncombustible complying with ASTM E136.
 3. Surface Burning Characteristics: When tested in accordance with ASTM E84.
 - a. Flame Spread: 20 maximum.
 - b. Smoke Development: Zero.
 - c. Class: Class A.
 4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 5. Comply with ASTM C1396/C1396M for water resistant and exterior gypsum soffit board.
 6. Basis of Design:
 - a. USG - Sheetrock Exterior Gypsum Firecode X.

2.5 FRAMING MATERIAL

- A. Thicknesses provided here are minimum and subject to increase by Delegated Engineer's design requirements.
 - 1. Studs: ASTM C645; galvanized sheet steel.
 - a. 0.0312 inch thick, C shape.
 - 2. Runners and Tracks: ASTM C645; galvanized sheet steel.
 - a. 0.0312 inch thick, C shape.
 - 3. Furring, Framing, and Accessories: ASTM C645; galvanized sheet steel.
 - a. 0.0312 inch thick, C shape.
 - 4. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel.
 - a. 0.0312 inch thick, C shape.
- B. Galvanizing: Comply with ASTM A653/A653M zinc-coated hot dipped galvanized steel.
 - 1. Interior Framing: G40.
 - 2. Exterior Framing: G60.
- C. Framed Partition Head To Structure Connections: Provide one of the following types and coordinate to provide fire rated constructed assemblies as indicated on Drawings.
 - 1. Single Long-Leg Runner System: ASTM C645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 - 2. Double-Runner System: ASTM C645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 - 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.
- D. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding strength, and other properties required to fasten steel members to substrates. Use screws with low profile head where board or other overlay sheathing is to be applied.
- E. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

2.6 SUSPENSION SUPPORT MATERIAL

- A. Suspension Systems: ASTM C635/C635M heavy-duty main beam classification; ASTM A653/A653M zinc-coated hot dipped galvanized steel; ASTM C645 Standard specification for rigid furring channels for screw application of gypsum board.
- B. Accessories: Stabilizer bars, clips, splices, and perimeter moldings required for suspended grid system.
- C. Support Channels and Hangers: Primed steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

2.7 ACOUSTIC ATTENUATION MATERIAL

- A. Acoustic Attenuation Insulation: Install at interior walls and ceilings as indicated on Drawings.
 - 1. Mineral Wool Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit.
 - a. Unfaced Type: ASTM C665 Type-I (unfaced).
 - b. Combustibility: Noncombustible complying with ASTM E136.
 - c. Surface Burning Characteristics: When tested in accordance with ASTM E84.
 - 1) Flame Spread: 25 maximum.

- 2) Smoke Development: 50 maximum.
 - d. Fungi Resistance: Passes when tested in accordance with ASTM C1338.
 - e. Nominal Density: Minimum 2.5 pcf when tested in accordance with ASTM C303.
 - f. Corrosivity to Steel: Passes when tested in accordance with ASTM C665.
 - g. Blanket Width: Sized to fully friction fit space between framing members.
 - h. Blanket Thickness: Sized to fully friction fit cavity, but not less than 3-1/2 inches.
 - i. Manufacturers:
 - 1) Johns Manville.
 - 2) Knauf Insulation.
 - 3) Owens Corning.
 - 4) Rockwool.
- B. Acoustic Sealant: For exposed and concealed joints and annular spaces around through-penetrations. Type to be non-sag, paintable, non-staining latex sealant complying with ASTM C834, ASTM C919 and as follows:
1. Basis of Design: As indicated on Drawings.
 2. Sealant to reduce airborne sound transmission through head-of-wall and bottom-of-wall joints and openings to accommodate through-penetrations in building construction as demonstrated by testing representative assemblies in accordance with ASTM E90.
 3. Sound Transmission Class: Sealant to maintain STC ratings at sound rated partitions as indicated on the drawings.
 4. Surface Burning Characteristics: When tested in accordance with ASTM E84.
 - a. Flame Spread: 10 maximum.
 - b. Smoke Development: 10 maximum.
 5. Mold and Mildew Resistance: Rating of zero (0), “no growth”, in accordance with ASTM G21.
 6. Movement Capability: 10 percent minimum, in accordance with ISO 11600.
 7. Sealant materials and methods shall conform to applicable governing codes and authorities having jurisdiction.
 8. Maximum volatile organic compound content to be in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- C. Acoustic Sprays: For exposed and concealed locations; sprayable latex material complying with ASTM C919 and the following:
1. Basis of Design: As indicated on Drawings.
 2. Spray to reduce airborne sound transmission through head-of-wall joints in building construction as demonstrated by testing representative assemblies in accordance with ASTM E90.
 3. Sound Transmission Class: Spray to maintain STC ratings at sound rated partitions as indicated on the drawings.
 4. Surface Burning Characteristics: When tested in accordance with ASTM E84.
 - a. Flame Spread: 10 maximum.
 - b. Smoke Development: 10 maximum.
 5. Mold and Mildew Resistance: Rating of zero (0), “no growth”, in accordance with ASTM G21.
 6. Movement Capability: 10 percent minimum, in accordance with ISO 11600.
 7. Spray materials and methods shall conform to applicable governing codes and authorities having jurisdiction.
 8. Maximum volatile organic compound content to be in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

2.8 ACCESSORIES

- A. Finishing Trim: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise. Includes trims such as corner beads, edge trim, control joints and expansion joints.
 - 1. Types: As detailed or required for finished appearance.
 - a. Continuous bead profile required for termination and protection of finish compound edge.
 - b. J-trim, without bead, is not allowed at gypsum board termination end unless indicated on Drawings.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
 - 3. Vinyl Beads and Trim:
 - a. Not permitted.
- B. Expansion Beads (Control Joints): Install at locations indicated on Drawings and not less than 20 feet o.c.
- C. Joint Materials: ASTM C475/C475M; reinforcing tape, joint compound, and water.
 - 1. Joint Tape:
 - a. Fiberglass Tape: 2 inch (50 mm) wide, open-weave coated glass fiber tape for joints and corners, except as otherwise indicated.
 - b. Paper Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 2. Joint Compound:
 - a. Drying-Type: Vinyl-based, ready-mixed.
 - b. Setting-Type: Chemical hardening, field-mixed.
- D. Screws for Fastening Board Materials to Steel Framing Members:
 - 1. Gypsum Board: Use S-Type screws complying with the following.
 - a. Metal thickness from 0.033 to 0.112 inch: ASTM C954; steel drill screws, corrosion resistant.
 - b. Metal thickness less than 0.033 inch: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- E. Exterior Soffit Vents: One piece, perforated, ASTM B221 6063 T5 alloy aluminum, with edge suitable for direct application to gypsum board and manufactured especially for soffit application. Provide continuous vent unless otherwise indicated on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION - GENERAL

- A. Section 01 73 00 - Execution: Related to installation of Work.

- B. The following minimum installation requirements are subject to more stringent requirements as may be indicated in the design by the Delegated Engineering Design.
- C. Environmental Limitations: Regarding application of gypsum board, joint treatment materials, and adhesives, comply with ASTM C840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- D. Do not install panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.4 METAL FRAMING INSTALLATION

- A. Install metal framing in accordance with GA-216, and ASTM C754.
- B. Wall Framing:
 - 1. Metal stud spacing to be 16 inches on center, minimum.
 - 2. Refer to Drawings for indication of partitions extending stud framing through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.
 - 3. Door Opening Framing: Reinforce openings as required for to withstand the forces imposed by the weight and operation of specified doors or operable panels, using not less than double studs at jambs and increased reinforcing as needed.
 - 4. Blocking: Screw wood blocking to studs. Install blocking as required for support of wall mounted construction, devices and equipment similar to, and not limited to, the following:
 - a. Toilet partitions and accessories; cabinet units; visual display surfaces; televisions and monitors; handrails; fixtures.
- C. Wall Furring:
 - 1. Erect wall furring for direct attachment to concrete masonry walls.
 - 2. Erect furring channels vertically; space maximum 24 inches o.c., not more than 4 inches from abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
 - 3. Erect metal stud framing spaced 1/2 inches from concrete masonry walls, attached by adjustable furring brackets.
 - 4. Wall Furring for Fire Ratings: Install furring as required for fire resistance ratings indicated and to GA-600 requirements.
- D. Ceiling Framing:
 - 1. Coordinate location of hangers with other work.
 - 2. Install ceiling framing independent of walls, columns, and above ceiling work.
 - 3. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.
 - 4. Laterally brace entire suspension system.

3.5 ACOUSTIC ACCESSORIES INSTALLATION

- A. Install acoustic accessories in accordance with GA-600 as related to sound control.
- B. Acoustic Attenuation Insulation: Friction fit insulation within framing cavity in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions. Thickness as required to fill cavity.

- C. Acoustic Sealant and Spray:
 - 1. General: Comply with Drawings and acoustic sealant and spray manufacturer's written installation instructions for products and applications indicated.
 - 2. Standards: Comply with recommendations of ASTM C919 for use of joint sealants in acoustical applications as applicable to materials, applications and conditions indicated.
 - 3. Install acoustic sealant backings of type indicated to support sealant and spray during application in accordance with manufacturer's written installation instructions.
 - 4. Install acoustic sealant and spray free of air pockets, embedded foreign matter, sags and ridges.
 - 5. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - a. Remove excess acoustic sealant from surfaces adjacent to joint.
 - b. Remove excess acoustic spray from surfaces adjacent to joint as indicated on the drawings.
 - c. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - d. Provide concave joint configuration unless otherwise indicated.

3.6 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with ASTM C840, and GA-216.
- B. Gypsum Board:
 - 1. Use screws when fastening gypsum board to metal furring or framing.
 - 2. Erect single layer gypsum board in most economical direction, with ends and edges occurring over firm bearing. Exception as follows:
 - a. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.
 - 3. Erect exterior gypsum sheathing in accordance with ASTM C1280, horizontally, with edges butted and ends occurring over firm bearing.
 - 4. Double Layer Applications: Secure second layer to first with fasteners. Place second layer parallel to first layer. Offset joints of second layer from joints of first layer.
 - 5. Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.
 - 6. Control Joints: Construct control joint in accordance with the drawings, GA-216, and as follows.
 - a. Place control joints consistent with lines of building space and features. When not indicated in the drawings, install control joints per GA-216 and as follows:
 - 1) Not more than 30 feet apart on walls over 50 feet long.
 - 2) At ceilings, not more than 30 feet apart in both directions.
 - 3) At interior and exterior gypsum and stucco soffits and bulkheads, at all inside corners of vertical surfaces not more than 30 feet apart on vertical and horizontal surfaces. Control joints installed on vertical surfaces shall continue, in alignment/direction and through corner finish, onto contiguous horizontal surface of like material (like treatment from horizontal surfaces to contiguous vertical surfaces).
 - 4) At interior and exterior soffits and bulkheads, not more than 30 feet apart on vertical and horizontal surfaces. Control joints installed on vertical surfaces shall continue, in alignment/direction and through corner finish, onto contiguous horizontal surface of like material (like treatment from horizontal surfaces to contiguous vertical surfaces).
 - 7. Place corner beads at external corners. Use longest practical length.

8. Edge Trim: Install LC Bead edge trim at locations where gypsum board abuts dissimilar materials. Allow appropriate space for application of appropriate sealant to seal and bridge between the gypsum finished edge trim and the dissimilar material.
9. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations shown on the drawings. Provide vent area indicated.

3.7 JOINT TREATMENT AND FINISH

- A. Finish in accordance with GA-214 and to Finish Level as indicated in Schedule at end of this Section.
- B. Fiberglass Joint Tape: Embed and finish with setting-type joint compound in the following locations and as otherwise recommended by board manufacturer for application conditions.
 1. Exterior Locations: All exterior locations.
 2. Interior Locations: Tile backer board locations.
 3. All Glass Mat Faced Board Locations: Interior and exterior.
- C. Paper Joint Tape: Embed with drying-type joint compound and finish with drying-type joint compound in the following locations.
 1. Exterior Locations: No paper joint tape to be used.
 2. Interior Locations: To be used at locations where fiberglass joint tape is not indicated.
- D. Tape, fill and sand joints, edges and corners, ready to receive finishes.

3.8 SHAFT WALL INSTALLATION

- A. Install in accordance with manufacturer's installation instructions, GA-216, GA-600, and ASTM C754.
- B. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches on center.
- C. Install studs at spacing required to meet performance requirements.
- D. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.
 1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.
 2. Seal perimeter of shaft wall and penetrations with acoustical sealant.

3.9 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Finished Gypsum Board Surface from Flat Surface: 1/8 inch in 10 feet in any direction.

3.10 SCHEDULES

- A. Finishes in accordance with Finish Level(s) indicated in GA-214:
 1. Level 1: Surfaces above finished ceilings and concealed from view.
 2. Level 5: All surfaces exposed to view (includes GWB that is painted or covered with adhered wall covering sheet materials).

END OF SECTION

SECTION 09 30 00

TILING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Tile and setting for floor applications.
 - 2. Tile and setting for wall applications.
 - 3. Thresholds.
 - 4. Trim and accessories.
 - 5. Non-ceramic trim.
 - 6. Tile Backer Board.

- B. Related Requirements:
 - 1. Section 03 30 00 - Cast-In-Place Concrete: Substrate for floor tile.
 - 2. Section 04 20 00 - Unit Masonry: Substrate for wall tile.
 - 3. Section 09 21 16 - Gypsum Board Assemblies: Framing and support construction for installation of tiling backer board specified in this Section.

1.2 REFERENCE STANDARDS

- A. American National Standards Institute:
 - 1. ANSI A108/A118/A136 - Installation of Ceramic Tile; Released 2020:
 - a. Includes ANSI A108.01, .02, .1A, .1B, .1C, .4, .5, .6, .8, .9, .10, .11, .12, .13, .14, .15, .16, and .17 - defines the installation of ceramic tile.
 - 1) ANSI A108.1A - Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar.
 - 2) ANSI A108.1B - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar.
 - 3) ANSI A108.11 - Interior Installation of Cementitious Backer Units.
 - 4) ANSI A108.13 - Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone.
 - b. Includes ANSI A118.1, .3, .4, .5, .6, .7, .8, .9, .10, .11, .12, .13, .15, and ANSI A136 - defines the test methods and physical properties for ceramic tile installation materials
 - 1) ANSI A118.1 - Dry-Set Cement Mortar.
 - 2) ANSI A118.3 - Chemical Resistant, Water Cleanable Tile-Setting and - Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.
 - 3) ANSI A118.4 - Modified Dry-Set Cement Mortar
 - 4) ANSI A118.5 - Chemical Resistant Furan Mortars and Grouts for Tile Installation.
 - 5) ANSI A118.7 - High Performance Cement Grouts for Tile Installation.
 - 6) ANSI A118.8 - Modified Epoxy Emulsion Mortar/ Grout.
 - 7) ANSI A118.9 - Test Methods and Specifications for Cementitious Backer Units.
 - 8) ANSI A118.10 - Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
 - 9) ANSI A118.11 - EGP (Exterior Glue Plywood) Modified Dry-Set Mortar.

- 10) ANSI A118.12 - Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
 - 11) ANSI A118.15 - Improved Modified Dry-Set Cement Mortar.
 - 12) ANSI A136.1 - Organic Adhesives for installation of Ceramic Tile.
 2. ANSI A137.1 - Standard Specification for Ceramic Tile, 2019.
 3. ANSI A137.2 - Standard Specifications for Glass Tile, 2019.
- B. ASTM International:
1. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete, 2017.
 2. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete, 2016.
 3. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products, 2016.
 4. ASTM C650 - Standard Test Method for Resistance of Ceramic Tile to Chemical Substances, 2004.
 5. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2018.
 6. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2018.
 7. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
 8. ASTM C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel; 2017.
 9. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2018.
 10. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
 11. ASTM D2394 - Standard Test Methods for Simulated Service Testing of Wood and Wood-Based Finish Flooring; 2017.
 12. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
 13. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications, 2016.
 14. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017.
 15. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
 16. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C, 2016.
 17. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- C. Tile Council of North America:
1. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation, 2018.
- D. California Department of Health Services (CA/DHS):
1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this Section; require attendance by all affected installers.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets on tile, mortar, grout, and accessories. Include manufacturer's recommendations for using installation of system components including, but not limited to, tile, setting materials, accessories, trim, grouts and adhesives.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, trim shapes and locations, junctions with dissimilar materials, control and expansion joints, termination edge conditions, accessories, areas receiving waterproofing membrane, and setting details.
- D. Samples for Initial Selections: Two manufacturer's complete set of color samples illustrating the full range of finishes, textures and colors available for each product; submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish, texture and color; samples to be same product material type indicated for final Work; each sample 12 x 12 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Operation and Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods. Include recommended polishes, waxes and other restorative/protective products and methods

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with ANSI A108/A118/A136 and TCNA (HB).
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this Section, with minimum ten (10) years of documented experience.
- C. Installer Qualifications: Company specializing in performing tile installation, with minimum of five (5) years of documented experience.
- D. Prior to grouting, prepare and protect the finish surfaces of tile work as needed to prevent staining of tile work during the grouting process and cleanup. Tile work that is stained by grout or other material is not acceptable tile work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Protect adhesives and other temperature sensitive materials from freezing or overheating in accordance with manufacturer's instructions.

1.8 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.

- B. Maintain ambient and substrate temperature of 50 degrees F (10 degrees C) during installation of mortar materials.

1.9 EXTRA MATERIALS

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Stock Materials:
 - a. Five (5) percent full size units of each product type, size, color, shape, profile and surface finish combination installed, but not less than the following:
 - 1) 20 square feet of field tiles.
 - 2) 5 units of each trim and accessory.
 - 3) 16 linear feet of each type and color non-ceramic trim.
 - 4) 16 linear feet of threshold.

PART 2 PRODUCTS

2.1 TILE

- A. Manufacturers: All products of each type by the same manufacturer.
 - 1. Crossville Tile Company: www.crossvilleinc.com.
 - 2. Dal-Tile Corporation: www.daltile.com.
 - 3. Trinity Tile: www.trinitytile.com.
 - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Porcelain Floor Tile: ANSI A137.1, Standard Grade.
 - 1. Moisture Absorption: 0.5 to 3.0 percent, tested in accordance with ASTM C373.
 - 2. Basis of Design:
 - a. As indicated on Drawings.
 - 3. Colors:
 - a. As indicated on Drawings.
 - 4. Grout Joints Size:
 - a. As recommended by manufacturer.
 - 5. Sizes:
 - a. As indicated on Drawings.
 - 6. Thickness: As indicated on Drawings, but not less than 3/8 inch.
 - 7. Shapes:
 - a. As indicated on Drawings.
 - 8. Edges:
 - a. Cushioned.
 - 9. Surface Finishes:
 - a. As indicated on Drawings.
 - 10. Patterns:
 - a. As indicated on Drawings.
 - 11. Tile Trim: Refer to TRIM AND ACCESSORIES article in this Section.
- C. Quarry Tile: ANSI A137.1, Standard Grade.
 - 1. Moisture Absorption: 0.5 to 3.0 percent, tested in accordance with ASTM C373.
 - 2. Chemical Resistance: Resistant, tested in accordance with ASTM C650.
 - 3. Basis of Design:
 - a. Dal Tile - Quarry Textures.
 - 4. Colors:
 - a. To be selected by Architect from submitted samples.

5. Grout Joints Size:
 - a. As recommended by manufacturer.
6. Sizes:
 - a. As indicated on Drawings, but not less than 6 x 6 inches.
7. Thickness: As indicated on Drawings, but not less than 1/2 inch.
8. Edges:
 - a. To be selected by Architect from submitted samples.
9. Surface Finishes:
 - a. Slip-resistant.
10. Patterns:
 - a. As indicated on Drawings.
11. Tile Trim: Refer to TRIM AND ACCESSORIES article in this Section.

2.2 TRIM AND ACCESSORIES

- A. Base Tile Trim Units - For Quarry Floor Tile
 1. Top Open Edges: Bullnosed open edge.
 2. Bottom:
 - a. Cove; edge to match floor tile edge type for flush transition.
 3. Inside Corners:
 - a. Cove
 4. Outside Open Corners:
 - a. Bullnosed open edge and provide single outcorner shape to include smooth cove transition.
 5. Same manufacturer and color as floor tile type.
 6. Lengths and Joints:
 - a. Match lengths and joints with adjacent floor tile joints.
 7. Height: 6 inches.
- B. Non-Ceramic Trim Components - For Porcelain Tile Trim:
 1. Application: All porcelain tile areas, unless indicated otherwise on Drawings.
 2. Metal Trim Type: To be installed as recommended by manufacturer and coordinated with tile installation materials.
 - a. Extruded Aluminum; factory finished.
 - b. Profile: Round to provide the following transitions.
 - 1) Provide coved inside corners and transitions from wall to floor.
 - 2) Provide bullnosed edge termination and fully rounded outside corners.
 - c. Colors, Finish, Size and Profiles:
 - 1) To be selected by Architect from submitted samples.
 3. Setting Materials:
 - a. As recommended by Trim Manufacturer and Tile Manufacturer for applicable substrates.
 4. Applications:
 - a. Open edges of wall tile.
 - b. Open edges of floor tile.
 - c. Wall corners, outside and inside.
 - d. Transitions between floor finishes of different heights and dissimilar types.
 - e. Expansion and control joints, floor and wall.
 - f. Floor to wall joints.
 - g. Borders and other trim as indicated on drawings.
 5. Manufacturers:
 - a. Schluter-Systems: www.schluter.com. (Basis of Design)

- C. Floor Tile Thresholds: Marble, White Carrarra color, honed finish; 2 inches wide by full width of wall or frame opening; both top edges beveled full length; without holes, cracks, or open seams.
 - 1. Thickness as required such that the finish top of adjacent flooring and top of threshold are as indicated on Drawings.
 - 2. Applications: Locations as follows, unless indicated otherwise on Drawings.
 - a. At doorways where tile terminates.
 - b. At open edges of floor tile where adjacent finish floor is dissimilar flooring material or is at different height.

2.3 SETTING MATERIALS

- A. Bond Coat Materials: As recommended by tile manufacturer and TCNA for substrate types and installation conditions.
 - 1. Latex/Polymer Modified Portland Cement Mortar:
 - a. Complying with ANSI A118.4.
 - 2. Modified Dry-Set Mortar for Large and Heavy Tile (LHT) Mortar:
 - a. Application: Bond coat for large tiles with at least one side measuring 15 inches or greater.
 - b. Complying with ANSI A118.4H.
 - c. Approved by manufacturer for application thickness 3/32 inch to 1/2 inch.
 - d. Manufacturers:
 - 1) Laticrete International, Inc. - LHT Plus.
 - 2) Mapei Corporation - Ultraflex LHT.
 - 3) H.B. Fuller Corporation, Inc. - TEC PermaFlex 300 LHT Mortar.
- B. Mortar Bed Materials: Thick-set mortar bed setting method.
 - 1. Pre-packaged or field-mixed; complying with ANSI A108.1A and ANSI A108.1B; includes portland cement, sand, latex additive, and water.

2.4 GROUT MATERIALS

- A. Manufacturers:
 - 1. Ardex Engineered Cements: www.ardexamericas.com/#sle.
 - 2. Custom Building Products: www.custombuildingproducts.com/#sle.
 - 3. Laticrete International, Inc.: www.laticrete.com/#sle.
 - 4. MAPEI Corporation: www.mapei.com.
 - 5. Merkrete, by Parex USA, Inc.: www.merkrete.com/#sle.
- B. High Performance Cement Grout: ANSI A118.7, polymer modified cement grout.
 - 1. Applications:
 - a. Use this type of grout where indicated and where no other type of grout is indicated.
 - 2. Use sanded grout for joints 1/8 inch wide and larger; if joint design is indicated to be less than 1/8 inch wide, use unsanded grout.
 - 3. Color(s): To be selected by Architect from full range of colors
 - 4. Basis of Design: Laticrete PermaColor Grout.
- C. Epoxy Grout: ANSI A118.3, chemical resistant and water-cleanable epoxy grout.
 - 1. Applications:
 - a. All Quarry Tile work.
 - 2. Use sanded grout for joints 1/8 inch wide and larger; if joint design is indicated to be less than 1/8 inch wide, use unsanded grout.
 - 3. Color(s): To be selected by Architect from full range of colors.
 - 4. Basis of Design: Laticrete SpectraLock Pro Premium.

2.5 TILE BACKER BOARD MATERIAL

- A. Cement Backer Board: Non-gypsum-based; aggregated portland cement backer board with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325 (Type B).
1. Application: Provide backer board as substrate for tiling application in wet areas including tub and shower surrounds, shower ceilings, and as otherwise indicated on Drawings. Coordinate material and installation with compatibility and requirements for tiling systems and manufacturer's recommendations.
 2. Combustibility: Noncombustible complying with ASTM E136.
 3. Surface Burning Characteristics: When tested in accordance with ASTM E84.
 - a. Flame Spread: Zero.
 - b. Smoke Development: Zero.
 - c. Class: Class A.
 4. Mold Resistance:
 - a. Score of 10, when tested in accordance with ASTM D3273.
 - b. Rating of zero for mold growth when tested in accordance with ASTM G21.
 5. Compressive Strength: 1,250 psi minimum, when tested in accordance with ASTM D2394.
 6. Thickness:
 - a. Interior Use: 5/8 inch.
 - b. Exterior Use: 5/8 inch.
 7. Spacing of support framing members to be as recommended by board manufacturer, but no greater than 16 inches OC.
 8. Screws for Fastening Board Materials to Steel Framing Members:
 - a. Non-corrosive type and in compliance with ANSI 108.11.
 9. Joint Tape and Finish Compound: Comply with ANSI 108.11 and as recommended by backer board manufacturer for compatibility with subsequent applied materials.
 - a. Do not use paper tape or gypsum joint compound.
 - b. Joint tape to be coated glass fiber mesh type and as recommended by backer board manufacturer for application conditions.
 10. Manufacturer:
 - a. USG - Durock Cement Board with EdgeGuard. (Basis of Design)
 - b. NGC - PermaBase Cement Board.
 11. Locations: Framed construction indicated to receive tile finish.
 - a. Wet Areas: Includes tile areas at tubs, showers, floor sinks and where otherwise indicated on Drawings
 - b. Other locations where the Drawings do not indicate backer board material type to be gypsum.

2.6 ACCESSORY MATERIALS

- A. Waterproofing Membrane: Provide membrane system designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10 (waterproofing).
1. Fluid or Trowel Applied Type:
 - a. Membrane Material: Synthetic rubber.
 - b. Thickness:
 - 1) 40 mils (1.00 mm), minimum, dry film thickness.
 - c. Products:
 - 1) Custom Building Products: RedGard Crack Prevention and Waterproofing Membrane: www.custombuildingproducts.com
 - 2) Laticrete International, Inc.: Laticrete Hydro Ban: www.laticrete.com

- 3) Merkrete, by Parex USA, Inc.: Merkrete Hydro Guard 2000:
www.merkrete.com
 - 4) TEC, an H.B. Fuller Construction Products Brand; TEC HydraFlex Waterproofing Crack Isolation Membrane: www.tecspecialty.com
 2. Crack Isolation Reinforcing Fabric: Fabric type as recommended by waterproofing membrane manufacturer.
 3. When both a Crack Isolation Membrane and a Waterproofing Membrane are indicated, both membranes are to be manufactured by same manufacturer and designed to be compatible with each other, the substrate, and the subsequent applied materials.
- B. Crack Isolation Membrane: Provide membrane system designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.12 (crack isolation).
 1. Fluid or Trowel Applied Type:
 - a. Membrane Material: Synthetic rubber.
 - b. Thickness:
 - 1) 40 mils (1.00 mm), minimum, dry film thickness.
 - c. Products:
 - 1) Custom Building Products: RedGard Crack Prevention and Waterproofing Membrane: www.custombuildingproducts.com
 - 2) Laticrete International, Inc.: Laticrete Hydro Ban: www.laticrete.com
 - 3) Merkrete, by Parex USA, Inc.: Merkrete Hydro Guard 2000:
www.merkrete.com
 - 4) TEC, an H.B. Fuller Construction Products Brand; TEC HydraFlex Waterproofing Crack Isolation Membrane: www.tecspecialty.com
 2. Crack Isolation Reinforcing Fabric: Fabric type as recommended by crack isolation membrane manufacturer.
 3. When both a Crack Isolation Membrane and a Waterproofing Membrane are indicated, both membranes are to be manufactured by same manufacturer and designed to be compatible with each other, the substrate, and the subsequent applied materials.
- C. Cleavage Membrane: ANSI A108.02.
 1. Polyethylene Sheeting: 4 mil (0.1 mm) thickness; complying with ASTM C171 or ASTM D4397.
 - a. Application: Under mortar bed of thick mortar bed tile installation method.
- D. Reinforcing Metal Fabric: ANSI A108.02.
 1. Welded Wire Fabric: 2 x 2 inches (51 by 51 mm) size weave of 16/16 wire size; welded fabric; galvanized steel; complying with ASTM A1064/A1064M.
 - a. Application: Suspended in mortar bed of thick mortar bed tile installation method.
 2. Diamond Metal Lath: 3.4 lb/sq yd, expanded diamond metal lath, complying with ANSI A108.1A (1.0 - 1.2, 1.4 and 5.1).
 - a. Application: Only where indicated on Drawings as diamond metal lath reinforcing. Suspended in mortar bed of thick mortar bed tile installation method.

2.7 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.

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

2.8 MAINTENANCE MATERIALS

- A. Tile Joint Sealant: Gunable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
 - 1. Applications: Control joints; tile surface change of plane; tile abutment joints to dissimilar materials such as, but not limited to, door frames, drains, gypsum wall board, concrete masonry units, and plumbing pipe penetrations.
 - 2. Color: Match grout color.
 - 3. Use sanded type for joints designed to be 1/8 inch or wider.
 - 4. Use unsanded type for joints designed to be less than 1/8 inch.
 - 5. Products: Same manufacturer as grout material or as per written recommendation from grout manufacturer.
- B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
 - 1. Composition: Water-based colorless silicone.
 - 2. Products: Same manufacturer as grout material or as per written recommendation from grout manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that substrates to be tiled are sound, smooth, and flat within the tolerances specified for that type of work and are ready to receive tiling.
- C. Verify that cracks in substrates to be tiled can be repaired, to include compatible crack isolation membrane, as required to prevent defects from occurring in the tiling work and finish. Remove and replace defective substrate materials
- D. Verify that sufficient solid anchorage materials are installed for anchoring other work elements that are to be secured through tile.
- E. Verify that substrates to be tiled are dust-free and free of substances that could impair bonding of membrane and setting materials to substrate surfaces.
- F. Verify that substrate slopes to drains where floor drains are indicated in contract documents.
- G. For mortar bed method of tile installation, verify that sub-floor is recessed deep enough to accommodate mortar bed thickness variations to achieve slope to floor drains.
- H. Verify the locations of areas that are to receive specified waterproofing membrane prior to proceeding with thin-set method and mortar bed method of tile installations.
- I. Verify that concrete and CMU substrates are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by manufacturers of tile system components.
- J. Verify that required floor-and wall mounted utilities and devices are at correct location, alignment, and elevation.
- K. Verify that floor drains are aligned as indicated on Drawings. If alignment is not indicated on Drawings, aligned parallel with tile pattern joint lines.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Protect surrounding work from damage.
- D. Vacuum clean surfaces and damp clean.
- E. Seal substrate surface cracks with filler compatible with tiling system components. Level existing substrate surfaces to acceptable flatness tolerances.
- F. Prepare substrate surfaces for installation of waterproofing and crack isolation membrane in accordance with membrane manufacturer's instructions.
- G. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.3 INSTALLATION - GENERAL

- A. Install tile, transition and termination trim, accessories, setting materials, grout, joint sealants and all tile work components in accordance with applicable requirements of ANSI A108/A118/A136, product manufacturer's instructions, TCNA (HB) recommendations, and the Drawings.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor, base, and wall joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size.
- E. Wall Corners: Form internal angles square and external angles bullnosed.
- F. Install non-ceramic trim in accordance with manufacturer's instructions.
- G. Install thresholds where indicated on Drawings and at floor tile open edges.
- H. Sound test tiles after setting. Replace hollow sounding tiles that are not fully bonded to substrate.
- I. Construct expansion, movement, control, contraction, perimeter and soft joints in compliance with the applicable TCNA (HB) Methods prescribed for joint construction type indicated.
 - 1. Keep such joints free of mortar, grout, adhesive and debris that can interfere with application of final joint construction components.
- J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- K. Prior to grouting, prepare and protect the finish surfaces of tile work as needed to prevent staining of tile work during the grouting process and cleanup. Tile work that is stained by grout or other material is not acceptable tile work.
- L. Grout tile joints unless otherwise indicated. Grout joints to be without voids, cracks, excess mortar or excess grout, or too little grout.
- M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.
- N. Install tile sealant at tile abutment joints to dissimilar materials such as door frames, drains, GWB, CMU and plumbing pipe penetrations; tile surface change of plane.
- O. Apply grout sealer in accordance with grout and tile manufacturers' instructions.

3.4 INSTALLATION - TILE BACKER BOARD

- A. Install panels and finish joints and fastener locations according to ANSI A108.11 and backer board manufacturer's written instructions for type of application indicated.

3.5 INSTALLATION - CRACK ISOLATION MEMBRANE

- A. Install components to comply with ANSI A108.17 (crack isolation), and manufacturer's written instructions.
- B. Existing Cracks: Comply with TCNA Method F125-Partial; bridging existing cracks and include use of crack isolation reinforcing fabric.
- C. Full Substrate Coverage: Comply with TCNA Method F125-Full; full substrate coverage.
 - 1. Include bridging existing cracks; TCNA Method F125-Partial.
 - 2. Membrane to be uniform thickness and bonded securely to substrate.
 - 3. Allow membrane to cure before installing tile or setting materials.

3.6 INSTALLATION - WATERPROOFING MEMBRANE

- A. Install components to comply with ANSI A108.13 (waterproofing), and manufacturer's written instructions.
- B. Existing Cracks: Comply with TCNA Method F125-Partial for bridging existing cracks and include use of crack isolation reinforcing fabric.
- C. Full Substrate Coverage:
 - 1. Include bridging existing cracks; TCNA Method F125-Partial.
 - 2. Membrane to be waterproof, uniform thickness and bonded securely to substrate.
 - 3. Allow membrane to cure and verify waterproof condition by testing before installing tile or setting materials.
- D. Transition of waterproofing membrane from floor tile to wall:
 - 1. Extend continuous floor membrane up behind wall base tile.
 - 2. Extend continuous floor membrane up behind wall tile.
 - a. Where Drawings indicate wall tile to be "without" waterproofing membrane, extend membrane up behind wall tile 4 inches from floor.
- E. Transition of waterproofing membrane from shower area to floor tile beyond where floor tile beyond is indicated to be "without" waterproofing membrane:
 - 1. Extend continuous floor membrane beyond shower curtain line minimum 36 inches in front of shower and 24 inches left and right of shower opening, and up behind wall base tile contiguous to the extended membrane areas. Feather membrane edges at perimeters of extended membrane areas.

3.7 INSTALLATION - INTERIOR FLOORS: THIN-SET METHOD

- A. To be used at locations where concrete substrate IS NOT DEPRESSED.
- B. TCNA Method F122: On-ground concrete.
 - 1. Locations: Wet areas and as indicated here; otherwise use TCNA Method F113.
 - a. Showers (all tiling surfaces).
 - b. Wash Basins (all tiling surfaces).
 - c. Group Toilet Rooms (floor tiling and wall base tiling only).
 - d. Single Occupancy Toilet Rooms (floor tiling and wall base tiling only).
 - e. Locker and Dressing Rooms (floor tiling and wall base tiling only).
 - f. Mechanical Rooms (floor tiling and wall base tiling only).
 - g. Areas with similar surfaces subject to periods of running or standing water.
 - h. Other areas indicated on Drawings to receive waterproofing membrane.

2. Waterproofing Membrane; ANSI A118.10.
 3. Crack Isolation Membrane; ANSI A118.12.
 - a. TCNA Method F125-Partial with crack isolation reinforcing fabric.
 4. Bonding Coat:
 - a. Latex/Polymer Modified Portland Cement Mortar; ANSI A118.4.
 - b. Modified Dry-Set Mortar for Large and Heavy Tile (LHT) Mortar; ANSI A118.4H.
 5. Grout:
 - a. High Performance Cement Grout; ANSI A118.7.
- C. TCNA Method F122A: Above-ground concrete.
1. Locations: Wet areas and as indicated here; otherwise use TCNA Method F113A.
 - a. Showers (all tiling surfaces).
 - b. Wash Basins (all tiling surfaces).
 - c. Group Toilet Rooms (floor tiling and wall base tiling only).
 - d. Single Occupancy Toilet Rooms (floor tiling and wall base tiling only).
 - e. Locker and Dressing Rooms (floor tiling and wall base tiling only).
 - f. Mechanical Rooms (floor tiling and wall base tiling only).
 - g. Areas with similar surfaces subject to periods of running or standing water.
 - h. Other areas indicated on Drawings to receive waterproofing membrane.
 2. Waterproofing Membrane; ANSI A118.10.
 3. Crack Isolation Membrane; ANSI A118.12.
 - a. TCNA Method F125-Partial with crack isolation reinforcing fabric.
 4. Bonding Coat:
 - a. Latex/Polymer Modified Portland Cement Mortar; ANSI A118.4.
 - b. Modified Dry-Set Mortar for Large and Heavy Tile (LHT) Mortar; ANSI A118.4H.
 5. Grout:
 - a. High Performance Cement Grout; ANSI A118.7.
- D. TCNA Method F113: On-ground concrete.
1. Locations:
 - a. Locations that ARE NOT indicated to receive waterproofing membrane in this Section or on Drawings.
 - b. Locations that ARE NOT indicated to be installed with other TCNA Method.
 2. Crack Isolation Membrane; ANSI A118.12.
 - a. TCNA Method F125-Partial: At all existing cracks.
 3. Bonding Coat:
 - a. Latex/Polymer Modified Portland Cement Mortar; ANSI A118.4.
 - b. Modified Dry-Set Mortar for Large and Heavy Tile (LHT) Mortar; ANSI A118.4H.
 4. Grout:
 - a. High Performance Cement Grout; ANSI A118.7.
- E. TCNA Method F113A: Above-ground concrete.
1. Locations:
 - a. Locations that ARE NOT indicated to receive waterproofing membrane in this Section or on Drawings.
 - b. Locations that ARE NOT indicated to be installed with other TCNA Method.
 2. Crack Isolation Membrane; ANSI A118.12.
 - a. TCNA Method F125-Partial: At all existing cracks.
 3. Bonding Coat:
 - a. Latex/Polymer Modified Portland Cement Mortar; ANSI A118.4.
 - b. Modified Dry-Set Mortar for Large and Heavy Tile (LHT) Mortar; ANSI A118.4H.

4. Grout:
 - a. High Performance Cement Grout; ANSI A118.7.

3.8 INSTALLATION - INTERIOR FLOORS: MORTAR BED METHOD

- A. To be used at locations where concrete substrate IS DEPRESSED.
- B. TCNA Method F114.
 1. Cleavage Membrane, as specified in this Section.
 2. Mortar Bed with Welded Wire Reinforcing Fabric; as specified in the Section.
 - a. Mortar Bed Thickness: Minimum 1-1/4 inches; maximum 2 inches.
 3. Bonding Coat: Latex/Polymer Modified Portland Cement Bond Coat; ANSI A118.4, as specified in this Section.
 4. Grout: Epoxy Grout; ANSI A118.3.

3.9 INSTALLATION - FLOORS: THICK MORTAR BED METHOD FOR WALK-IN COOLER/FREEZER

- A. Basis of Design: Install in accordance with Laticrete Technical Data Sheet TDS 121 - R 2013; Commercial Freezers and Coolers; for installing tile over metal insulated panel.
 1. Steel, metal or aluminum substrates must be rigid and meet the standard for maximum allowable deflection of L/360 for tile.
 2. Tack weld or mechanically fasten 3.4 lb per sq yd, expanded diamond metal lath complying with the current revision of ANSI A108.1 (3.3 Requirements for lathing and portland cement plastering), ANSI A108.02 (3.6 Metal lath) and ANSI A108.1A (1.0 - 1.2, 1.4 and 5.1). Apply latex-portland cement mortar as scratch/leveling coat comprised of 3701 Fortified Mortar Bed; or, 226 Thick Bed Mortar gauged with 3701 Mortar Admix over wire lath, concrete or masonry in compliance with current revision of ANSI A108.01 (3.3.5.1) and A108.1A (1.4). Float surface of scratch/leveling coat plumb, true and allow mortar to set until firm.
 3. Install Laticrete HYDRO BAN or 9235 Waterproofing Membrane over the hardened concrete or mortar bed.
 4. Tile can then be installed with polymer thin-set mortar Laticrete 254 Platinum or 254R Platinum Rapid.
 5. Grout:
 - a. Laticrete - Spectralock 2000 IG: ANSI A118.5, furan grout, chemical resistant.
 6. Refer to Laticrete ES-S314 for a more complete description of this method.

3.10 INSTALLATION - WALLS: THIN-SET METHODS

- A. TCNA Method W202E.
 1. Locations:
 - a. Exterior and interior locations on masonry and concrete substrates.
 - b. Waterproofing membrane required in wet areas, and for exterior applications, or if otherwise indicated on Drawings.
 2. Waterproofing Membrane; ANSI A118.10 (waterproofing), specified in this Section.
 3. Bonding Coat:
 - a. Latex/Polymer Modified Portland Cement Mortar:
 - 1) Complying with ANSI A118.4.
 - b. Modified Dry-Set Mortar for Large and Heavy Tile (LHT) Mortar; ANSI A118.4H.
 4. Grout:
 - a. High Performance Cement Grout: ANSI A118.7.
- B. TCNA Method W244E.
 1. Locations:

- a. Exterior and interior locations on metal framed walls.
 - b. Waterproofing membrane required in wet areas, and for exterior applications, or if otherwise indicated on Drawings.
 2. Backer Board: Cement backer board; ANSI A118.9 or ASTM C1325 (Type B).
 3. Waterproofing Membrane; ANSI A118.10 (waterproofing), specified in this Section.
 4. Bonding Coat:
 - a. Latex/Polymer Modified Portland Cement Mortar:
 - 1) Complying with ANSI A118.4.
 - b. Modified Dry-Set Mortar for Large and Heavy Tile (LHT) Mortar; ANSI A118.4H.
 5. Grout:
 - a. High Performance Cement Grout: ANSI A118.7.
- C. TCNA Method W247.
1. Locations:
 - a. Interior locations on metal framed walls; non-wet areas only.
 - b. Waterproofing membrane required if indicated on Drawings.
 2. Backer Board: Fiber-Reinforced Water-Resistant Gypsum Tile Backing Board; ASTM C1278/C1278M.
 3. Waterproofing Membrane; ANSI A118.10 (waterproofing), specified in this Section.
 4. Bonding Coat:
 - a. Latex/Polymer Modified Portland Cement Mortar:
 - 1) Complying with ANSI A118.4.
 - b. Modified Dry-Set Mortar for Large and Heavy Tile (LHT) Mortar; ANSI A118.4H.
 5. Grout:
 - a. High Performance Cement Grout: ANSI A118.7.

3.11 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Remove and replace unacceptable tiles. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement. Unacceptable tiles include, but are not limited to, the following:
 1. Tile that is damaged.
 2. Tile that does not match adjoining tile or is not compliant with the color/pattern indicated.
 3. Tile that is not fully bonded to substrate.

3.12 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean all ceramic tile surfaces so they are free of foreign matter.
- C. Remove grout residue and stains from tile as soon as possible.
- D. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions and use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.13 PROTECTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven (7) days after grouting is completed.
- D. Remove protective coverings and clean for substantial completion inspection and for final inspection. Between inspections, reinstall protective coverings and maintain protection of work.

3.14 SCHEDULE

- A. Kitchens, Food Service Lines, Food Storage Areas, Dishwashing Areas, and other Kitchen connected ancillary rooms:
 - 1. Tile: Quarry Tile.
- B. Exterior Can Wash Area.
 - 1. Tile: Quarry Tile.
- C. All Tile Areas Not Indicated In Items A and B Above:
 - 1. Tile: Porcelain Tile.

END OF SECTION

SECTION 09 51 13
ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Acoustic Panels.
 - 2. Suspended Metal Grid Ceiling Systems and Perimeter Trim.
 - 3. Suspended Acoustical Clouds.

- B. Related Requirements:
 - 1. Section 01 40 00 – Quality Requirements: Mockup requirements indicated in Schedule of Mockups at the end of Section 01 40 00.
 - 2. Section 04 20 00 - Unit Masonry.
 - 3. Section 07 95 13 - Expansion Joint Cover Assemblies.
 - 4. Section 09 21 16 - Gypsum Board Assemblies.
 - 5. Division 21 - Fire Suppression: Devices in ceiling system.
 - 6. Division 23 - HVAC: Devices in ceiling system.
 - 7. Division 26 - Electrical: Devices in ceiling system.
 - 8. Division 27 - Communications: Devices in ceiling system.
 - 9. Division 28 - Electronic Safety and Security: Devices in ceiling system.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings, 2013.
 - 2. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels, 2013.
 - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials, 2016.
 - 4. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.2016.
 - 5. ASTM E1264 - Standard Classification for Acoustical Ceiling Products, 2014.

- B. Ceilings and Interior Systems Construction Association:
 - 1. CISCA - Acoustical Ceilings: Use and Practice.
 - 2. CISCA - Seismic Zone:
 - a. Seismic (Zones 0-2) Recommendations for Direct-hung Acoustical Tile and Lay-in Panel Ceilings, 2004.
 - b. Seismic (Zones 3-4) Guidelines for Seismic Restraint for Direct Hung Suspended Ceiling Assemblies, 2004.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

- B. Product Data:
 - 1. Submit data on metal grid system components, acoustic panels and accessories.

- C. Shop Drawings: Show grid layout and dimensioning, panel layouts, lighting fixtures, air diffusers, grilles, and all other items exposed in acoustical ceilings, locations of seismic braces and hangers, and suspension, seismic and bracing details. Show details of junctions with other work or ceiling finishes, and special conditions.
- D. Provide seismic design of suspended ceiling systems under direct supervision of Professional Engineer experienced in design of this Work and licensed in State in which the project is located.
 - 1. Calculations showing that suspension systems will provide full compliance with seismic structural requirements, including the Seismic Design Category indicated on Structural Drawings. Calculations to be sealed by Professional Structural Engineer. Comply with CISCA - Seismic Zone requirements as dictated by the Seismic Design Category indicated on Structural Drawings.
- E. Samples: Submit two samples 6 x 6 inches in size illustrating material and finish of acoustic panels.
- F. Samples: Submit two samples each, 6 inches long, of suspension system main runner, cross runner, perimeter molding and seismic components.
- G. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.4 QUALITY ASSURANCE

- A. Conform to CISCA requirements.
- B. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum five (5) years documented experience.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustic panel installation.

1.7 SEQUENCING

- A. Section 01 30 00 - Administrative Requirements: Scheduling and sequencing.
- B. Sequence Work to ensure acoustic ceilings are not installed until building is enclosed, sufficient air temperature and humidity level is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- C. Install acoustic panels after interior wet work is dry.

1.8 EXTRA MATERIALS

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Furnish 100 sq ft of extra panels of each type and size of acoustical panel to Owner.

PART 2 PRODUCTS

2.1 ACOUSTICAL PANEL CEILINGS

- A. Manufacturers:
 - 1. Armstrong World Industries.
 - 2. CertainTeed.
 - 3. USG Interiors.
 - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Performance / Design Criteria:
 - 1. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1: 360.
 - 2. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated according to ASCE 7 and applicable codes.

2.2 ACOUSTIC PANELS

- A. Acoustic Panels (Type A):
 - 1. Basis of Design: Armstrong, Ultima (1910), Square, ASTM E1264, conforming to the following:
 - a. Classification: Type IV, Form 2, Pattern E, Fire Class A.
 - b. Size: 24 x 24 inches.
 - c. Thickness: 3/4 inches.
 - d. Composition: Mineral fiber.
 - e. Light Reflectance: 0.90 percent.
 - f. NRC: 0.70.
 - g. CAC: 35.
 - h. Edge: Square.
 - i. Surface Color: White.
 - j. Surface Finish: Textured.
 - k. Grid: Type 1 as indicated in this Section.
- B. Acoustic Panels (Type B):
 - 1. Basis of Design: Armstrong, Health Zone Ultima (1935), Square, ASTM E1264, conforming to the following:
 - a. Classification: Type IV, Form 2 Pattern E, Fire Class A.
 - b. Size: 24 x 24 inches.
 - c. Thickness: 3/4 inch.
 - d. Composition: Mineral fiber.
 - e. Light Reflectance: 0.86 percent.
 - f. NRC: 0.70
 - g. CAC: 35.
 - h. Edge: Square.
 - i. Surface Color: White.
 - j. Surface Finish: Light texture.
 - k. Grid: Type 1 as specified in this Section.

2.3 SUSPENDED METAL GRID

- A. Suspended Metal Grid (Type 1):
 - 1. Basis of Design:
 - a. Manufacturer to be same as manufacturer of ceiling panel to be installed.
 - 2. Non-fire Rated Grid: ASTM C635/C635M, intermediate duty; exposed T; components die cut and interlocking.
 - 3. Grid Materials: Commercial quality cold rolled steel with galvanized coating.

4. Exposed Grid Surface Width:
 - a. 15/16 inch.
5. Grid Finish Color: White.
6. Accessories: Stabilizer bars, clips, splices, and perimeter moldings required for suspended grid system.
7. Support Channels and Hangers: Primed steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
8. Perimeter Wall Angles:
 - a. 7/8 inch.

2.4 SUSPENDED ACOUSTICAL CLOUDS

- A. Suspended Acoustical Clouds
 1. Basis of Design:
 - a. As indicated on the Drawings.
 2. Perimeter Trim: Finish, height, bottom edge, profiles and configurations to be as indicated on Drawings.
 - a. If not indicated on Drawings:
 - 1) Finish: Match finish of suspended metal grid system to which trim is attached.
 - 2) Height:
 - a) 6 inches.
 - 3) Width of return leg at bottom edge to be as required for secure attachment to components of suspended grid system, but not less than 7/16 inch wide. Bottom alignment to be flush with suspended grid system.
 - 4) Curved and straight profiles and configurations to conform to layouts indicated on Drawings.

2.5 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
 1. At Exposed Grid:
 - a. Provide L-shaped molding for mounting at same elevation as face of grid.
 2. Manufactured Corners: Provide single piece seamless corners conforming to corner angle or radius.
 3. Manufactured Radius: Provide seamless radius trim at maximum lengths practical but not less than 8 feet.
- C. Touch-up Paint: Type and color to match acoustic and grid units.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Examination, coordination and project conditions.
- B. Verify layout of hangers will not interfere with other work.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.

- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.

- B. Suspended Grid System:

1. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
2. Install suspension system in accordance with manufacturer's seismic requirements and installation guide and in compliance with the Seismic Design Category design requirements.
3. Install system capable of supporting imposed loads to deflection of 1/360 maximum.
4. Locate system on room axis according to reflected plan.
5. Ceiling areas over 1,000 SF must have horizontal restraint wire or rigid bracing.
6. Ceiling areas over 2,500 SF must have seismic separation joints or full height partitions.
7. Install after major above ceiling work is complete. Coordinate location of hangers with other work. Coordinate with sprinkler MEP work for oversized trim if not braced. Ceilings without rigid bracing must have 2" oversized trim rings for sprinklers and other penetrations.
8. Ends of main beams and cross tees must be tied together to prevent their spreading.
9. Cable trays and electrical conduits must be independently supported and braced.
10. Suspended ceilings are subject to special inspection.
11. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
12. Do not allow suspension system components to touch ducts, pipes, conduit or other ceiling installations. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
13. Do not hang suspension system from roof deck.
14. Do not hang suspension system from non-structural building elements.
15. Changes in ceiling plane must have positive bracing.
16. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers and related carrying channels to span extra distance.
17. Do not support components on main runners or cross runners when weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
18. Do not eccentrically load system, or produce rotation of runners.
19. Perimeter Molding:
 - a. Install edge molding at intersection of ceiling and vertical surfaces.
 - b. Use longest practical lengths.
 - c. Install manufactured seamless corners.
 - d. Install manufactured seamless radius trim at curved walls and round columns.
 - e. Install at junctions with other interruptions.
20. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

- C. Acoustic Panels:

1. Fit acoustic panels in place, free from damaged edges or other defects detrimental to appearance and function.
2. Lay directional patterned panels as shown on the Drawings. Fit border trim neatly against abutting surfaces.
3. Install panels after above ceiling work is complete.

4. Install acoustic panels level, in uniform plane, and free from twist, warp, and dents.
5. Cutting Acoustic Panels:
 - a. Cut to fit irregular grid and perimeter edge trim.
 - b. Cut square edges to field cut panels.
 - c. Double cut and field paint exposed edges of tegular panels.
6. Install hold-down clips to retain panels tight to grid system within 10 feet of exterior door.
7. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.
8. Install safety clips on wood veneer panels 2 inches from outside edge of panel and at 24 inches on center.
9. Install acoustical insulation as indicated on Drawings.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.
- B. Clean installed work in accordance with manufacturer's recommended materials and procedures.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect against modifications to completed suspension and hanger systems by unathurized persons.
- C. Protect installed work from damage and marring of finishes. Remove and replace components that become damaged

3.7 SCHEDULES

- A. Refer to Reflected Ceiling Plans on Drawings for locations of panel types.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient tile flooring.
 - 2. Resilient wall base.
 - 3. Accessories.
- B. Related Requirements:
 - 1. Section 03 30 00 - Cast-In-Place Concrete: Finishing of floor slab for resilient floor application.
 - 2. Sections indicating Plumbing, Electrical and Mechanical utility boxes, devices and trim.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM D2240 - Standard Test Method for Rubber Property-Durometer Hardness; 2015.
 - 2. ASTM D3389 - Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader); 2016.
 - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source, 2017.
 - 5. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials, 2017.
 - 6. ASTM F150 - Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring; 2006 (Reapproved 2013).
 - 7. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
 - 8. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2014).
 - 9. ASTM F1344 - Standard Specification for Rubber Floor Tile; 2015.
 - 10. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2013a.
 - 11. ASTM F1861 - Standard Specification for Resilient Wall Base, 2016.
 - 12. ASTM F2170-16b - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
 - 13. ASTM F2195 - Standard Specification for Linoleum Floor Tile; 2013.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source, 2015.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data describing physical and performance characteristics; include manufacturer's full range of sizes, patterns and colors available; include moldings, transition

and edge trim as indicated on Drawings and otherwise recommended by manufacturer of Resilient Floor products; include installation instructions.

- C. Samples for Initial Selection: Two manufacturer's complete set of color samples illustrating the full range of finishes and colors available; submit for Architect's initial selections.
- D. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples to be same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- E. Mock-ups: Install at project site a job mock-up using acceptable products and manufacturer approved installation methods, including concrete substrate testing. Obtain Architect's acceptance of finish color, texture and pattern, and workmanship standards.
 - 1. Mock-up Size and Location: One typical room; location as indicated by Architect.
 - 2. Incorporation: Mock-up may be incorporated into the final construction upon Architect's approval.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.5 QUALITY ASSURANCE

- A. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- B. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter in accordance with ASTM E648 or NFPA 253.
- C. Smoke Density: 450 or less in accordance with ASTM E662.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- C. Store all materials off of the floor in an acclimatized, weather-tight space.
- D. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

- C. Store materials for not less than 48 hours prior to installation in area of installation at temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.9 WARRANTIES

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Vinyl Composition Tile: Provide five (5) year manufacturer's warranty.

1.10 EXTRA MATERIALS

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Resilient Tile Flooring: 50 sq ft of each type and color.
- C. Resilient Wall Base: 100 lineal feet of each type and color.

PART 2 PRODUCTS

2.1 RESILIENT TILE FLOORING

- A. Vinyl Composition Tile:
 - 1. Manufacturers:
 - a. Armstrong Flooring, Inc. (Basis of Design)
 - 1) Imperial Texture, Standard Excelon.
 - b. Mannington Commercial.
 - c. Johnsonite, a Tarkett Company.
 - d. Substitutions: Section 01 60 00 - Product Requirements.
 - 2. Minimum Requirements: Comply with ASTM F1066, of Class specified.
 - a. Class 2 - Through pattern tile.
 - 3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter in accordance with ASTM E648 or NFPA 253.
 - 4. Smoke Density: 450 or less in accordance with ASTM E662.
 - 5. Tile Size:
 - a. 12 x 12 inches.
 - 6. Total Thickness: 0.125 inch.
 - 7. Colors and Patterns:
 - a. As indicated on Drawings.
- B. Luxury Vinyl Tile: Solid vinyl with color and pattern throughout thickness.
 - 1. Manufacturers:
 - a. Amtico Company.
 - b. Flexco, Inc.
 - c. Johnsonite, a Tarkett Company.
 - d. Metroflor Corporation.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Minimum Requirements: Comply with ASTM F1700.
 - a. Class and Type:
 - 1) As indicated on Drawings.
 - 3.
 - 4. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter in accordance with ASTM E648 or NFPA 253.
 - 5. Smoke Density: 450 or less in accordance with ASTM E662.
 - 6. Tile Size:

- a. As indicated on Drawings.
 - b. To be selected by Architect from submitted samples.
7. Wear Layer Thickness:
- a. As indicated on Drawings.
8. Total Thickness:
- a. 100 mil (0.100 inch).
 - b. 197 mil (0.197 inch)
9. Colors, Patterns and Surface Textures:
- a. As indicated on Drawings.
 - b. To be selected by Architect from submitted samples.

2.2 RESILIENT WALL BASE

- A. Manufacturers:
1. Johnsonite, a Tarkett Company. (Basis of Design)
 2. Burke Flooring.
 3. Roppe Corporation.
 4. Substitutions: Section 01 60 00 - Product Requirements
- B. Rubber Wall Base:
1. Comply with ASTM F1861.
 - a. Type TS – Rubber, vulcanized thermoset.
 - b. Group 1 – Solid.
 - c. Style B – Top set, Cove.
 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 3. Smoke Density: 450 or less in accordance with ASTM E662.
 4. Height:
 - a. 4 inches.
 5. Thickness: 0.125 inch thick.
 6. Finish: Satin.
 7. Length: Roll.
 8. Accessories: Premolded external corners and end stops.
 9. Colors: Solid.
 - a. To be selected by Architect from submitted samples.

2.3 RESILIENT STAIR COVERING

- A. Manufacturers:
1. Burke Flooring.
 2. Johnsonite, a Tarkett Company.
 3. Roppe Corporation.
 4. Substitutions: Section 01 60 00 - Product Requirements
- B. Rubber Tread and Riser Covering: Single piece nosing/tread/riser type. Full width and depth of stair nosing/tread/riser in one piece; nosing not less than 1-3/4 inches deep with contrasting color, non-slip abrasive strip insert.
1. Manufacturers:
 - a. Johnsonite, a Tarkett Company (Basis of Design).
 - b. Substitutions: Section 01 60 00 - Product Requirements
 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter in accordance with ASTM E648 or NFPA 253.
 3. Smoke Density: 450 or less in accordance with ASTM E662.
 4. Nosing Nominal Thickness: Minimum 0.210 inch.
 5. Nosing Style: Square, capable of conforming and adhering to angle of riser below.

- a. Bottom edge of nosing shall abut and join to top edge of riser covering material without gap or void and in manner as to prevent protruding trip hazard at bottom of nosing edge. Minimum 1-5/8 inch nosing turn-down onto riser below.
 - b. Integral non-slip abrasive nose strip; contrasting color complying with visually impaired requirements.
 - 1) Width to be 2 inches.
 - c. Integral photoluminescent (glow-in-the-dark) nose strip; 2 inches wide (1 inch along nose vertical face and 1 inch along nose top); contrasting color complying with visually impaired requirements.
6. Tread Design Pattern:
 - a. To be selected by Architect from submitted samples.
 7. Stair Landings Flooring: Same manufacturer, material, color and pattern as the Stair Covering.
 8. Colors: Integral throughout product.
 - a. To be selected by Architect from submitted samples.

2.4 ACCESSORIES

- A. Subfloor Filler: Premix latex; types recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by resilient flooring manufacturer.
- C. Moldings, Transition and Edge Strips: As indicated on Drawings or as otherwise selected by Architect from Product Data submittals.
- D. Feature Strips: Of same material as tile. Width as indicated on Drawings.
- E. Sealer and Wax: Types recommended by resilient flooring product manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Examination, coordination and project conditions.
- B. Verify that surfaces are flat and smooth to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- C. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- D. Moisture Testing: Moisture emissions from concrete subfloors must not exceed 5 lbs per 1,000 psi per 24 hours via the Calcium Chloride Test Method and not exceed 85% internal concrete relative humidity as tested in accordance with ASTM F2170-16b. If more restrictive value are required by flooring product manufacturer, comply with the more restrictive values.
- E. The pH level of the subfloor surface shall not be higher than 9.9. If higher, subfloor must be neutralized.
- F. Cementitious Sub-floor Surfaces:
 1. Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH. Test in accordance with ASTM F710.
 2. Verify that substrates exhibit no carbonization or dusting.

- G. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- H. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.
- B. Prepare materials to be installed and equipment to be used during installation.
- C. Prepare substrates to receive work as recommended by work product manufacturers.
- D. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- E. Prohibit traffic until filler is cured.
- F. Clean substrate.
- G. Apply primer as recommended by resilient flooring product manufacturer and where required to prevent "bleed-through" or interference with adhesion.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. General:
 - 1. Starting installation constitutes acceptance of sub-floor conditions.
 - 2. Install in accordance with manufacturer's written instructions and recommendations to ensure warranty requirements.
 - 3. Spread only enough adhesive to permit installation of materials before initial set.
 - 4. Fit joints and butt seams tightly.
 - 5. Set flooring in place, press with heavy roller to attain full adhesion. Sound top surface of installed flooring material to ensure there are no hollow sounds (a hollow sound may be an indication of flooring that is not adhered/bonded to substrate).
 - 6. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door (door in closed position).
 - 7. Install edge transition strips at unprotected or exposed edges, where flooring terminates, where flooring transitions to dissimilar flooring finishes and as indicated on Drawings.
 - 8. Resilient Strips: Attach to substrate using adhesive.
 - 9. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
 - 10. Install flooring in recessed floor access covers, maintaining floor pattern.
 - 11. At movable partitions, install flooring under partitions without interrupting floor pattern.
 - 12. If feature strips/designs are indicated on Drawings, install feature strips/designs.
- C. Resilient Tile Flooring:
 - 1. Mix tile from containers to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
 - 2. Unless flooring layout design is indicated otherwise on Drawings, lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.
 - 3. Install tile to pattern indicated on Drawings. Allow minimum 1/2 full size tile width at room or area perimeter.
- D. Resilient Wall Base:

1. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
 2. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
 3. Install base on solid backing. Bond tightly to wall and floor surfaces. Bottom edge of wall base should be consistently in contact with finished flooring.
 4. Scribe and fit to door frames and other interruptions.
- E. Resilient Stair Coverings:
1. Install stair coverings in one piece for full width and depth of tread.
 2. Install stringers configured tightly to stair profile.
 3. Adhere over entire surface. Fit accurately and securely.
 4. Ensure the nosing fully conforms to the angle of the riser below and that the bottom edge abuts and joins the riser covering top edge without gap or void. Ensure that the bottom edge of the nosing does not create a protruding tripping hazard.

3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Remove excess adhesive from floor, base, and wall surfaces without damage.
- C. Clean, seal, and maintain resilient flooring products.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Prohibit traffic on resilient flooring for 48 hours after installation.
- C. Protect flooring work from stains and damage.

END OF SECTION

SECTION 09 77 23

FABRIC WRAPPED PANELS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fabric wrapped glass fiber panels.
 - 2. Fabric wrapped wood fiber panels.
- B. Related Requirements:
 - 1. Section 04 20 00 - Unit Masonry: Mounting substrate.
 - 2. Section 09 21 16 - Gypsum Board Assemblies: Mounting substrate.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2017.
 - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017.
- B. Forest Stewardship Council:
 - 1. FSC Guidelines - Forest Stewardship Council Guidelines.
- C. California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data including core construction and profile options, fabric, mounting options and accessory materials.
- C. Shop Drawings:
 - 1. Indicate layout and dimensions of acoustical wall panels, edge profiles, core materials, and fabric face.
 - 2. Indicate interface with adjacent materials.
- D. Samples for Initial Selection: Two manufacturer's complete set of color charts illustrating the full range and premium range of fabrics, patterns, finishes and colors available; include 12 x 12 inches panel core with mounting hardware secured, illustrating core construction; submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected fabric, pattern, finish, and color; each sample to be 12 x12 inches illustrating actual panel construction with mounting hardware secured. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Installation Instructions:
 - 1. Submit manufacturers written installation instructions.
 - 2. Submit special procedures, and perimeter conditions requiring special attention.
- G. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Submit fabric care and maintenance procedures, recommended fabric maintenance materials, and suggested schedule for fabric cleaning.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three (3) years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum five (5) years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in manufacturer's original packaging. Inspect for damage.
- C. Store materials indoors with environmental conditions as specified for installation.
- D. Acclimate materials to installation conditions for seventy-two (72) hours prior to installation.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install acoustical wall treatment until space has been enclosed and is watertight, wet work is complete and dry and adjacent and related work is completed.
- C. Do not install acoustical wall until ambient temperature and humidity level will be continuously maintained at conditions indicated for Owner occupancy.

1.8 EXTRA MATERIALS

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts, and maintenance products.
- B. Provide 20 percent extra panels for each panel size, color, and pattern provided or furnished.
 - 1. Where calculation of required extra panels generates a fraction of a panel, the fraction is to be rounded up to another full panel.
 - 2. Include mounting hardware for each extra panel provided. Hardware to be same as was used for installed panels.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index (Class 1/Class A) when tested in accordance with ASTM E84.

2.2 FABRIC WRAPPED GLASS FIBER PANELS

- A. Manufacturers:
 - 1. AVL Systems, Inc.
 - 2. Conwed Designscape.

3. Decoustics.
 4. Lamvin, Inc.
 5. Sound Seal.
 6. Wenger/JR Clancy.
 7. Substitutions: Section 01 60 00 - Product Requirements.
- B. Basis of Design:
1. AVL Systems, Inc.: AcousTech.

Architect, coordinate your panel thickness, NRC, and SAC (below) with your specified Mfrs and Basis of Design (above). Consider not specifying SAC data unless critical to your acoustic design.

- C. Acoustic Performance: Tested per ASTM C423 (Type A, F5, or F6 mounting). Minimum values indicated.
1. 2 Inch Thick Panels:
 - a. Noise Reduction Coefficient (NRC):
 - 1) NRC: 1.10
 - b. Sound Absorption Coefficients (SAC):
 - 1) 125 Hz: 0.38
 - 2) 250 Hz: 0.96
 - 3) 500 Hz: 1.16
 - 4) 1000 Hz: 1.16
 - 5) 2000 Hz: 1.11
 - 6) 4000 Hz: 1.28
- D. Core Material:
1. Rigid Glass Fiber Board:
 - a. Density: 6 pcf, minimum.
 - b. Resin hardened at edges and hardware attachment locations.
- E. Thickness:
1. 2 inches thick, unless indicated otherwise on Drawings.
- F. Edge Profile:
1. Chamfered edges, unless indicated otherwise on Drawings.
- G. Fabric Covering: Manufacturer's premium acoustic fabric with fire retardant treatment.
1. Basis of Design:
 - a. As indicated on Drawings.
 - 1) Pattern/Color: As indicated on Drawings.
- H. Panel Sizes and Locations:
1. Provide panels as indicated on Drawings.
- I. Accessories:
1. Mounting Hardware:
 - a. Manufacturer's standard concealed mechanical clip system.
- J. Fabrication:
1. Bond fabric covering directly to the core material and return minimum 1-1/4 inch onto back of panel to provide finished and secured edges.
 2. Attach mounting hardware to back of panel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify substrate is flat, plumb, and level and ready to receive the work of this section.
- C. Verify adjacent and related work is complete.

3.2 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install panels plumb, level, in plane, and aligned.
- C. Line up edge and end joints.

3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Indicated Position: 1/4 inch.
- C. Maximum Offset From Indicated Alignment: 1/16 inch.
- D. Maximum Out of Square: 1/4 inch difference in panel diagonals.

3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean exposed fabric faces in accordance with manufacturer's recommendations.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and field application of paints, stains, varnishes, intumescent paint, concrete floor sealer and other coatings.
- B. Related Requirements:
 - 1. Section 05 50 00 - Metal Fabrications: Shop primed items.
 - 2. Section 05 51 00 - Metal Stairs: Shop primed items.
 - 3. Section 09 72 14 - Tackable Wall Coverings: Trim.
 - 4. Sections including work indicated to receive painting and coating.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
 - 2. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
- B. Master Painters Institute:
 - 1. MPI (APL) - Approved Products List; Master Painters and Decorators Association.
 - 2. MPI (APSM) - Architectural Painting Specification Manual.
- C. Painting and Decorating Contractors of America (PDCA):
 - 1. PDCA - Architectural Painting Specification Manual.
- D. SSPC: The Society for Protective Coatings:
 - 1. SSPC V1 (PM1) - Good Painting Practice: Painting Manual Volume 1; 5th Edition, September 2016
 - 2. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual Volume 2; 2015 Edition, 2015
 - 3. SSPC-SP 13 - Surface Preparation of Concrete.
- E. California Department of Health Services (CA/DHS):
 - 1. CA/DHS/EHLB/R-174 - Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- F. Green Seal (GS):
 - 1. GC-03 - Anti-Corrosive Paints.
 - 2. GS-11 - Product Specific Environmental Requirements.
- G. South Coast Air Quality Management District (SCAQMD):
 - 1. SCAQMD Rule 1113 - Architectural Coatings.

1.3 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

- B. Product Data: Submit data on all finishing products.
- C. Samples for Initial Selection: Submit two paper chip samples; 2 x 3 inches in size; illustrating range of colors, sheens and textures available for each surface finishing product indicated; submit for Architect's initial selections.
 - 1. For clear top coats on stained wood, samples to illustrate range of colors and sheens available as applied to wood species required in construction.
 - 2. For clear top coats on non-stained wood, samples to illustrate sheens available as applied to wood species required in construction.
- D. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected color, sheen and texture. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
 - 1. For opaque paint samples, submit each on tempered hardboard; minimum 8 x 8 inches.
 - 2. For clear top coats on stained and non-stained wood; submit each on finished wood species required in construction; minimum 8 x 8 inches.
- E. Manufacturer's Installation Instructions: Submit special surface preparation procedures and substrate conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 77 00 - Closeout Procedures.
- B. Operation and Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
- B. Applicator: Company specializing in performing work of this section with minimum ten (10) years documented experience.

1.7 MOCKUP

- A. Section 01 40 00 - Quality Requirements: Mock-up requirements.
- B. Construct mockup, in one room, illustrating coating color, sheen, texture, and finish.
- C. Locate where directed by Architect.
- D. Incorporate accepted mockup as part of Work.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- D. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.

- B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.
- C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candle measured mid-height at substrate surface.

1.10 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Furnish five (5) year manufacturer warranty for paints and coatings.
- C. Contractor to provide a one (1) year warranty on all defects.
- D. Installer to provide a two (2) year warranty on all materials and workmanship.

1.11 EXTRA MATERIALS

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Supply 1 gallon of each color, sheen, type and surface texture; store where directed by Owner.
- C. Label each container with color, sheen, type, surface texture and room locations, in addition to manufacturer's label.

PART 2 PRODUCTS

2.1 PAINTS AND COATINGS

- A. Basis of Design: As indicated on Drawings.
- B. Manufacturers:
 - 1. The Sherwin-Williams Company (SW).
 - 2. Benjamin Moore (BM).
 - 3. PPG - Glidden Professional (GP) (GP is a product of PPG Architectural Finishes).
 - 4. PPG Architectural Finishes (PPG).
 - 5. Pratt & Lambert Paints (P&L) - Epoxy Coatings Only.
 - 6. Where a Basis of Design is indicated, equal products from the above list of manufacturers are allowed.
 - 7. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

- A. All materials and paints shall be lead and mercury free and shall have low VOC content where possible.
- B. Coatings: Ready mixed, except field catalyzed coatings. Prepare coatings:
 - 1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.

2. For good flow and brushing properties.
 3. Capable of drying or curing free of streaks or sags.
 4. Interior Flat and Non-Flat Paints: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
 5. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
 6. Interior Clear Wood Finishes: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve finishes specified; commercial quality.
1. Interior Clear Wood Finishes: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- D. Patching Materials: To be compatible with the substrate and paint/coating materials; use latex patching materials where compatible with substrate and paint/coating materials; use tinted or stainable patch materials where wood substrates are indicated to be stained.
- E. Recessed Fastener Head Filler Materials: To be compatible with the substrate and paint/coating materials; use latex filler materials where compatible with substrate and paint/coating materials; use tinted or stainable patch materials where wood substrates are indicated to be stained.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify surfaces are ready to receive Work as instructed by product manufacturer.
- C. Examine surfaces indicated to be finished prior to commencement of work. Report conditions capable of affecting proper application.
- D. Test shop applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture content of surfaces is in accordance with the coating manufacturer's recommendations and is below the following maximums:
 1. Gypsum Wallboard: 12 percent.
 2. Masonry, Concrete and Concrete Unit Masonry: 12 percent.
 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
 5. Concrete Floors and Traffic Surfaces: 8 percent.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section. Prepare materials to be installed and equipment used during installation.
- B. Preparations to be executed with methods and materials compatible with paints and coatings to be applied.
- C. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- D. Surfaces: Correct defects and clean surfaces thoroughly prior to applications.
- E. Seal marks and surfaces that might cause bleed through or staining of top coat.
- F. Remove marks and foreign matter from substrates indicated for transparent or semi-transparent coatings.
- G. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- H. Aluminum Surfaces Indicated for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- I. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- J. Gypsum Board Surfaces: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled fastener heads and tape joints must be sanded smooth and all dust removed prior to painting. Exterior surfaces must be spackled with exterior grade compounds. Fill minor defects with filler compound. Spot prime defects after repair.
- K. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- L. Concrete: Remove release agents, curing compounds, efflorescence, irregular surfacing, foreign matter, stains, chalk and laitance. Prepare surface as recommended by finishes manufacturer and according to SSPC-SP 13. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds the lesser of that permitted in manufacturer's written instructions and that indicated in this Section. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- M. Concrete Floors Requiring Seal Finish (Does not include Polished Concrete Floor Finishing, see Division 3):
 - 1. Use preparation procedures and products as recommended by manufacturer of concrete floor sealer.
- N. Unit Masonry Surfaces Indicated to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- O. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with patching material compatible with the plaster and the indicated coatings. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

- P. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand power tool wire brushing or sandblasting; clean by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
- Q. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
- R. Surfaces Indicated to Receive Fire-Retardant Intumescent Paint: Use preparation procedures and products as recommended by manufacturer of Intumescent Paint system.
- S. Metal Doors and Frames Indicated for Painting: Prime metal door top and bottom edge surfaces.
- T. Wood Surfaces:
 - 1. Indicated to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried and prime filled areas; sand between coats. For exterior applications, back prime concealed surfaces before installation.
 - 2. Indicated to Receive Transparent Finish: Wipe off dust and grit prior to application of finishing materials. Fill nail holes and cracks with stainable filler or filler tinted to match the intended final wood appearance. For exterior applications, prime concealed surfaces with indicated finish material.
- U. Glue-Laminated Wood Beams Indicated for Field Applied Finishing: Prior to finishing, wash surfaces with solvent, remove grease and dirt.
- V. Floor and Roof Concrete Planks: Where underside of planks is exposed to view, install continuous joint sealant materials to seal joints including joints between planks, around perimeters and voids.

3.3 APPLICATION

- A. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- B. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.
- C. For concrete masonry units and other porous masonry and cementitious materials indicated to receive painting/coating, apply the primer coating as needed to fill all pinholes prior to applying finish top coats.
- D. Sand surfaces lightly between coats to achieve required finish.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Where clear finishes are required, tint fillers to match wood and apply to match wood texture. Remove excess from surface.
- G. Prime concealed surfaces of interior woodwork with primer paint.
- H. Finishing Mechanical and Electrical Equipment:
 - 1. Paint shop primed equipment. Paint shop finished items occurring at interior areas.
 - 2. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately. Reinstall after paint is cured.
 - 3. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are shop finished.

4. Paint interior surfaces of air ducts visible through grilles and louvers with one coat of flat black paint to visible surfaces. Paint dampers exposed behind louvers, grilles, to match face panels.
 5. Paint exposed conduit and electrical equipment occurring in finished areas.
 6. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
 7. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
- I. Finishing Overhead Construction Indicated as Open To Structure (exposed to view):
1. This provision includes finishing of overhead construction above suspended ceilings and clouds that do not extend to wall. This condition allows overhead construction to be seen above and over the suspended ceiling or cloud. Therefore, such overhead construction must be painted to eliminate unsightly overhead conditions that are visible.
 2. This provision does not include mechanical and electrical utility rooms, unless indicated otherwise on Drawings.
 3. Apply fast-drying, flat interior dry-fall type alkyd to all overhead construction Work and surfaces. Such surfaces include, but are not limited to, roof decking, structural steel, bracing and supports, and mechanical and electrical work.
 - a. Dry-Fall application does not apply to the following:
 - 1) Items with manufacturer's fully prefinished final coatings such as light fixtures, life safety devices and required warning postings.
 - 2) Surfaces scheduled to receive manufacturer's fully prefinished final coatings or field applied coatings other than Dry-Fall. Such surfaces may include wood laminated beams and underside of wood plank ceilings.

3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Collect waste material which may constitute fire hazard, place in closed metal containers, and remove daily from site.

3.5 SCHEDULE - EXTERIOR SURFACES

- A. Steel - Unprimed:
 1. One coat of alkyd primer.
 - a. Benjamin Moore P-06 Super Spec HP Alkyd Metal Primer.
 - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
 - c. Sherwin-Williams All Surface Enamel Oil Primer.
 2. Two top coats of alkyd enamel, Semi-gloss.
 - a. Benjamin Moore 110 Moore's Alkyd High Gloss House Paint.
 - b. Glidden Professional Devflex 4216L High Performance Acrylic Semi-Gloss.
 - c. Sherwin-Williams SWP Exterior Gloss Oil Base Paint.
- B. Steel - Shop Primed:
 1. Touch-up with alkyd primer.
 - a. Benjamin Moore P-06 Super Spec HP Alkyd Metal Primer.
 - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
 - c. Sherwin-Williams All Surface Enamel Oil Primer.
 2. Two top coats of alkyd enamel, Semi-gloss.
 - a. Benjamin Moore 110 Moore's Alkyd High Gloss House Paint.
 - b. Glidden Professional Devflex 4216L High Performance Acrylic Semi-Gloss.
 - c. Sherwin-Williams SWP Exterior Gloss Oil Base Paint.

- C. Steel - Galvanized:
 - 1. One coat galvanize primer.
 - a. Benjamin Moore P04 Super Spec HP Acrylic Metal Primer.
 - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
 - c. Sherwin-Williams Galvite HS Primer.
 - 2. Two top coats of alkyd enamel, Semi-gloss.
 - a. Benjamin Moore 110 Moore's Alkyd High semi-gloss House Paint.
 - b. Glidden Professional Devflex 4216L High Performance Acrylic Semi-Gloss.
 - c. Sherwin-Williams SWP Exterior semi-gloss Oil Base Paint.
- D. Aluminum - Mill Finish:
 - 1. One coat etching primer.
 - a. Benjamin Moore P04 Super Spec HP Acrylic Metal Primer.
 - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
 - c. Sherwin-Williams Galvite HS Primer.
 - 2. Two top coats of alkyd enamel, Semi-gloss.
 - a. Benjamin Moore 110 Moore's Alkyd High semi-gloss House Paint.
 - b. Glidden Professional Devflex 4216L High Performance Acrylic Semi-Gloss.
 - c. Sherwin-Williams SWP Exterior semi-gloss Oil Base Paint.

3.6 SCHEDULE - INTERIOR SURFACES

- A. Surfaces Indicated to Receive 1-Hour Rated Fire-Retardant Intumescent Paint System:
 - 1. See Drawings for designated locations and applicable UL Design.
 - 2. Primer for Intumescent Paint System.
 - a. Albi 487S Primer.
 - 3. Intumescent Paint System.
 - a. Albi Clad 800, thickness as required to achieve the required fire-retardant rating. Minimum cure time is seven days before finish top coats can be applied (or longer if recommended by Intumescent Paint manufacturer).
 - 4. Finish with two top coats of finish paint as designated below for the substrate type.
- B. Concrete Masonry Units:
 - 1. Two coats of block filler.
 - a. Glidden Professional Bloxfil 4000 Heavy Duty Acrylic Block Filler.
 - b. Pittsburgh Paints 6-7 SpeedHide Int/Ext Masonry Block Filler
 - c. Sherwin-Williams PrepRite Interior/Exterior Latex Block Filler.
 - 2. Two top coats of latex, Eggshell.
 - a. Glidden Professional Ultra-Hide 150 Interior Latex Eggshell 1412V Series.
 - b. Pittsburgh Paints SpeedHide Interior Acrylic Latex Eggshell 6-4xx Series.
 - c. Sherwin-Williams ProMar 200 Zero VOC Interior Latex Eggshell.
- C. Concrete Masonry Units - Epoxy Paint:
 - 1. Locations:
 - a. Kitchen, Serving Areas and connecting Rooms and Areas with Doors and Openings to Kitchen and Serving Areas.
 - 1) Where unit masonry wall IS NOT indicated to be Parged, provide the following:
 - a) Three coats, minimum, of epoxy block filler.
 - b) Two top coats, minimum, of epoxy top coat.
 - c) Apply additional coats as required to achieve even surface finish acceptable to the local Health Department having jurisdiction.
 - d) All surfaces must be acceptable to Health Department officials and pass the "ketchup test" parameters.

- 2) Where unit masonry wall IS indicated to be Parged, provide the following:
 - a) One coat, minimum, of epoxy block filler.
 - b) Two top coats, minimum, of epoxy top coat.
 - b. Dining Rooms, Cafeterias, Locker Rooms, Toilets and Janitor Closets.
 - 1) Three coats of epoxy block filler.
 - 2) Two top coats of epoxy top coat.
 2. Epoxy Block Filler.
 - a. As recommended by top coat manufacturer for specific substrate
 3. Epoxy Top Coats of acrylic epoxy, Semi-gloss.
 - a. PPG Architectural Pitt-Glaze WB1 Interior Pre-Catalyzed Water-Borne Acrylic Epoxy Semi-Gloss, 16-5xx Series (MPI 153).
 - b. Pratt & Lambert Krylon Industrial PreCat Water-Borne Acrylic Epoxy Semi-Gloss, K000Z72xx Series (MPI 153).
 - c. Sherwin-Williams Pro Industrial Pre-Catalyzed Water Based Acrylic Epoxy Semi-Gloss, K46xxxxxx Series (MPI 153).
 - D. Concrete Floors Requiring Seal Finish: (Does not include Polished Concrete Floor Finish, see Division 3)
 1. One coat Penetrating Liquid Densifier: Lithium silicate sealer, hardener, and densifier.
 - a. Manufacturers:
 - 1) Prosoco - Consolideck LS. (Basis of Design)
 - 2) Convergent Concrete Technologies - Pentra-Sil (NL).
 - 3) Substitutions: Section 01 60 00 - Product Requirements.
 - b. Apply in accordance with manufacturer's recommendations.
 2. Two coats Protective Surface Treatment: Lithium silicate hardener.
 - a. Manufacturers:
 - 1) Prosoco - Consolideck PolishGuard. (Basis of Design)
 - 2) Convergent Concrete Technologies - Pentra-Guardl (HP).
 - 3) Substitutions: Section 01 60 00 - Product Requirements.
 - b. Apply in accordance with manufacturer's recommendations.
 - E. Steel - Unprimed:
 1. One coat of acrylic primer.
 - a. Benjamin Moore P04 Super Spec HP Acrylic Metal Primer.
 - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
 - c. Pittsburgh Paints 90-912 Pitt-Tech Plus Interior/Exterior DTM Industrial Primer.
 - d. Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer.
 2. Two top coats of acrylic enamel, Semi-gloss.
 - a. Benjamin Moore 376 Eco Spec WB Acrylic Latex, Zero VOC, Semi-Gloss Enamel.
 - b. Glidden Professional Lifemaster Oil Interior/Exterior Semi-Gloss 1506.
 - c. Pittsburgh Paints 90-1210 Pitt-Tech Plus Interior/Exterior Semi-Gloss DTM Industrial Enamel.
 - d. Sherwin-Williams ProClassic Waterbased Acrylic-Alkyd Semi-Gloss Enamel.
 - F. Steel - Primed:
 1. Touch-up with acrylic primer.
 - a. Benjamin Moore P04 Super Spec HP Acrylic Metal Primer.
 - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
 - c. Pittsburgh Paints 90-912 Pitt-Tech Plus Interior/Exterior DTM Industrial Primer.
 - d. Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer.

2. Two top coats of acrylic enamel, Semi-gloss.
 - a. Benjamin Moore 376 Eco Spec WB Acrylic Latex, Zero VOC, Semi-Gloss Enamel.
 - b. Glidden Professional Lifemaster Oil Interior/Exterior Semi-Gloss 1506.
 - c. Pittsburgh Paints 90-1210 Pitt-Tech Plus Interior/Exterior Semi-Gloss DTM Industrial Enamel.
 - d. Sherwin-Williams ProClassic Waterbased Acrylic-Alkyd Semi-Gloss Enamel.
- G. Steel - Galvanized:
 1. One coat acrylic primer.
 - a. Benjamin Moore P04 Super Spec HP Acrylic Metal Primer.
 - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
 - c. Pittsburgh Paints 90-912 Pitt-Tech Plus Interior/Exterior DTM Industrial Primer.
 - d. Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer.
 2. Two top coats of acrylic enamel, Semi-gloss.
 - a. Benjamin Moore 376 Eco Spec WB Acrylic Latex, Zero VOC, Semi-Gloss Enamel.
 - b. Glidden Professional Lifemaster Oil Interior/Exterior Semi-Gloss 1506.
 - c. Pittsburgh Paints 90-1210 Pitt-Tech Plus Interior/Exterior Semi-Gloss DTM Industrial Enamel.
 - d. Sherwin-Williams ProClassic Waterbased Acrylic-Alkyd Semi-Gloss Enamel.
- H. Aluminum - Mill Finish:
 1. One coat etching primer.
 - a. Benjamin Moore P04 Super Spec HP Acrylic Metal Primer.
 - b. Glidden Professional Devflex 4020PF Direct to Metal Primer and Finish.
 - c. Pittsburgh Paints 90-912 Pitt-Tech Plus Interior/Exterior DTM Industrial Primer.
 - d. Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer.
 2. Two top coats of acrylic enamel, Semi-gloss.
 - a. Benjamin Moore 376 Eco Spec WB Acrylic Latex, Zero VOC, Semi-Gloss Enamel.
 - b. Glidden Professional Lifemaster Oil Interior/Exterior Semi-Gloss 1506.
 - c. Pittsburgh Paints 90-1210 Pitt-Tech Plus Interior/Exterior Semi-Gloss DTM Industrial Enamel.
 - d. Sherwin-Williams ProClassic Waterbased Acrylic-Alkyd Semi-Gloss Enamel.
- I. Gypsum Board Walls:
 1. One coat of latex primer sealer.
 - a. Benjamin Moore Ultra Spec 500 Waterborne Interior Latex Primer, N534 (MPI 50).
 - b. PPG Architectural Speedhide Interior Latex Sealer Quick-Drying, 6-2 (MPI 50).
 - c. Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28W02600 (MPI 50).
 2. Two top coats of latex enamel, Eggshell.
 - a. Benjamin Moore Regal Select Premium Interior Paint & Primer Eggshell, 549/K549 (MPI 44, MPI 138).
 - b. PPG Architectural Speedhide Interior Enamel Latex Eggshell, 6-411 (MPI 44).
 - c. Sherwin-Williams ProMar 400 Zero VOC Eg-Shel, B20W046xx (MPI 44).
- J. Gypsum Board Walls - Epoxy Paint:
 1. Locations:

- a. Kitchen, Serving Areas and connecting Rooms and Areas with Doors and Openings to Kitchen, Serving Areas, Dining Rooms, Locker Rooms, Toilets and Janitor Closets.
 - 1) One coat of epoxy primer sealer.
 - a) As recommended by top coat manufacturer for specific substrate.
 - 2) Two top coats of acrylic epoxy, Semi-gloss [Eggshell].
 - a) PPG Architectural Pitt-Glaze WB1 Interior Pre-Catalyzed Water-Borne Acrylic Epoxy Semi-Gloss, 16-510 Series (MPI 153).
 - b) Pratt & Lambert Krylon Industrial PreCat Water-Borne Acrylic Epoxy Semi-Gloss, K000Z7200 Series (MPI 153).
 - c) Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Acrylic Epoxy Semi-Gloss, K46W00151 Series (MPI 153).

- K. Gypsum Board Ceilings and Bulkheads:
 - 1. One coat of latex primer sealer.
 - a. Benjamin Moore Eco Spec WB Interior Latex Primer, N372/F372 372 (MPI 50, MPI 149).
 - b. PPG Architectural Speedhide Interior Latex Sealer Quick-Drying, 6-2 (MPI 50).
 - c. PPG Architectural Speedhide Interior Zero VOC Latex Sealer, 6-4900XI (MPI 50).
 - d. Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28W02600 (MPI 50).
 - 2. Two top coats of latex, Eggshell.
 - a. Benjamin Moore Regal Select Premium Interior Paint & Primer Eggshell, 549/K549 (MPI 44, MPI 138).
 - b. PPG Architectural Speedhide Interior Enamel Latex Eggshell, 6-411 (MPI 44).
 - c. Sherwin-Williams ProMar 200 Zero VOC Eg-Shel, B20W12651 (MPI 52).

- L. Insulated Coverings - Canvas and Cotton:
 - 1. One coat of latex primer sealer.
 - a. Same as “Gypsum Board Ceilings”.
 - 2. Two top coats of latex, Flat.
 - a. Same as “Gypsum Board Ceilings”.

- M. Dry Fall (Dry Fog)
 - 1. One coat of primer sealer.
 - a. As recommended by top coat manufacturer for each substrate type.
 - 2. Two top coats of latex, Flat.
 - a. Benjamin Moore Super Kote 5000 Dry Fall Acrylic Latex Flat (MPI 118).
 - b. PPG Architectural Speedhide Super Tech WB Interior Dry Fog Flat Latex (MPI-118).
 - c. Sherwin-Williams Waterborne Acrylic DryFall (MPI 118).

- N. Wood - Transparent Top Coat on Stained and Non-Stained Wood:
 - 1. Filler coat (for open grained wood only).
 - 2. One coat sealer.
 - a. To be compatible with other finish application materials.
 - 3. Three top coats of transparent acrylic coating, Semi-gloss.
 - a. Benjamin Moore Aqua Plastic Waterborne Urethane Clear Semi-Gloss 1WB-1410 (MPI 129).
 - b. PPG Architectural Interior Varnish, 100% Acrylic Crystal, Semi-Gloss 194100 (MPI 129).
 - c. Sherwin-Williams Minwax Water Based Polyurethane Clear Semi-Gloss 63020/71032 (MPI 129).

- O. Wood - Stain:
 - 1. Penetrating Stain
 - a. To be compatible with other finish system materials, including transparent top coats.
 - 2. One coat sealer.
 - a. To be compatible with other finish system materials.
 - 3. Three top coats; refer to “Wood - Transparent Top Coat” above.
- P. Wood - Painted:
 - 1. One coat of prime sealer.
 - a. As recommended by top coat manufacturer for specific substrate.
 - 2. Two top coats of latex, Semi-gloss.
 - a. Benjamin Moore Ultra Spec 500 Waterborne Interior Gloss N540 (MPI 54).
 - b. PPG Architectural Speedhide Interior Enamel Latex Semi-Gloss 6-5XX (MPI 54).
 - c. Sherwin-Williams ProMar 400 Zero VOC Interior Latex Gloss B21W04651 (MPI 54).
- Q. Colors and Locations for painting and coating applications:
 - 1. Drawings and Schedules on Drawings provide additional information regarding Colors (Basis of Design) and Locations.
 - a. Other Colors and Locations as selected by Architect.

END OF SECTION

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SECTION 10 11 00
VISUAL DISPLAY UNITS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Markerboards.
 - 2. Graphic (Music) Markerboards.
 - 3. Tackboards.
- B. Related Requirements:
 - 1. Section 04 20 00 - Unit Masonry: Substrate construction.
 - 2. Section 09 21 16 - Gypsum Board Assemblies: Substrate construction.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A135.4 - Basic Hardboard.
 - 2. ANSI A208.1 - Mat-Formed Wood Particleboard.
- B. ASTM International:
 - 1. ASTM A424 - Standard Specification for Steel, Sheet, for Porcelain Enameling.
 - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- C. California Department of Health Services:
 - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on types of visual display surfaces, components and accessories included in this Section.
- C. Shop Drawings: Indicate wall elevations, dimensions, anchor details and joint locations of units and finishes. Include a schedule of unit descriptions to be installed, sorted by room numbers from Drawings.
- D. Samples for Initial Selection: Two manufacturer's complete sets of color samples illustrating the full range of finishes and colors available for each visual display type; include full range of finish trim options. Submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples to be same product material type indicated for final Work; each sample 12 x 12 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 77 00 - Closeout Procedures.
- B. Submit Operation and Maintenance Data. Include specifications for manufacturer recommended markers to be used on markerboards.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.

1.6 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.7 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Furnish five (5) year manufacturer's warranty for visual display surfaces other than markerboards.
 - 1. Warranty shall cover replacement of Work found to be defective in material or installation.
- C. Furnish fifty (50) year manufacturer's warranty for Porcelain-on-Steel Markerboards.
 - 1. Warranty shall cover replacement of defective Porcelain-on-Steel Markerboards due to discoloration, excessive fading of color, crazing, cracking or flaking. Warranty does not cover the cost of removal or reinstallation.

1.8 EXTRA MATERIALS

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Markers: Provide one (1) pack of red, blue and green markers for each markerboard installed. Markers to be type as recommended by markerboard manufacturer.

PART 2 PRODUCTS

2.1 VISUAL DISPLAY UNITS

- A. Manufacturers:
 - 1. Marsh Industries Inc.
 - 2. Claridge Products and Equipment.
 - 3. Ghent Manufacturing Inc.
 - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Markerboards:
 - 1. Manufactured and factory assembled units
 - 2. Outer Face Sheet: 24 gauge steel face with porcelain enamel finish fused to the steel sheet face.
 - a. Face Sheet shall be a magnetic, non-porous surface and shall wipe clean with an eraser or dry cloth.
 - b. Deposition coat of 2.0 to 2.5 mils on front of steel.
 - c. Deposition coat of 1.5 to 2.0 mils on back of steel.
 - d. Porcelain enamel steel writing and erasing coat system, totaling 3.5 to 4.5 mils over front surface.
 - e. Firing temperature must be no less than 1450 deg. F.
 - f. Hardness of writing surface shall be uniform in color and texture.
 - g. Reflectance Factor: To be no more than 20% or less than 15%, nor vary as a result of wear.
 - h. Writing surface shall be no less than 6.5 MOH's scale.
 - i. Color: As selected from manufacturer's standard colors.

3. Backing Core: Particle board, 1/2 inch thick.
 4. Backing Surface: 0.015 in. aluminum sheet vapor barrier; moisture retardant, laminated with suitable, low VOC emitting adhesive to prevent delamination.
 5. Lamination of all materials to be factory type only, with adhesives. Hand lamination is not acceptable.
 6. Splice Joint: Concealed spline of sheet steel.
 7. Chalkrail: Extruded aluminum; triangular profile, one piece full length of markerboard, cast aluminum end closures; concealed fasteners.
 - a. At physical activity spaces such as weight lifting rooms, dance studios, gyms and multi-purpose rooms, do not provide protruding chalkrails; rather, provide recessed type for markers and erasers.
 8. Maprail: Extruded aluminum with one (1) inch wide continuous tackable composition cork insert and with maprail end stops/closures. Provide above full length of markerboard surfaces.
 9. Size: As indicated on Drawings.
 10. Locations: As indicated on Drawings.
- C. Components and fabrication to match except as follows: Markerboard Surface Graphic (Music) Markerboards: Components and fabrication to match Markerboards and with the following added provisions:
1. Graphic Lines - "Fused-On" lining for porcelain enamel steel writing surfaces where indicated on drawings. Painted-On-Lines are not acceptable
 - a. Music Staff Lines:
 - 1) Five (5) Lines Each Staff.
 - 2) 1 inch Between Each Line.
 - 3) 3 to 5 inches Space Between Each Staff (equal spaces).
 - 4) 5 inches Border at Top & Bottom.
 - 5) Line Thickness: 1/16 inch.
 - 6) Length of lines as shown on Drawings.
 2. Size: As indicated on Drawings.
 3. Locations: As indicated on Drawings.
- D. Tackboards:
1. Manufactured and factory assembled units.
 2. Outer Facing:
 - a. Seamless composition cork sheet; 1/4 inch thick; laminated under pressure to backing core.
 - b. Color: As selected by Architect from submitted samples.
 3. Backing Core: Hardboard, 1/4 inch thick.
 4. Backing Surface: 0.015 in. aluminum sheet vapor barrier; moisture retardant, laminated with suitable, low VOC emitting adhesive to prevent delamination.
 5. Lamination of all materials to be factory type only, with adhesives. Hand lamination is not acceptable.
 6. Splice Joint: Concealed spline of sheet steel.
 7. Maprail: Extruded aluminum with one (1) inch wide continuous tackable composition cork insert and with maprail end stops/closures. Provide above full length of markerboard surfaces.
 8. Size: As indicated on Drawings.
 9. Locations: As indicated on Drawings.

2.2 MATERIALS

- A. Sheet Steel: ASTM A424, Type I, commercial quality.
- B. Particleboard: ANSI A208.1, wood chips, set with waterproof resin binder, sanded faces.

1. Interior Composite Wood Products: Meets California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- C. Hardboard: ANSI A135.4, tempered, smooth face.
- D. Foil Backing: Aluminum foil sheet, 0.015 inch thick.
- E. Composition Cork: Formulation of pure cork granules, compounded with linseed oils, rosin binders, mineral fillers and pigments to form a uni-colored composition cork on burlap backing reinforcing; color as selected.
- F. Frames, Maprails, Tackstrips, Trim and Chalkrails: Aluminum extrusions, ASTM B221, 6061 alloy, T5 temper.
- G. Adhesives: Type used by manufacturer.
 1. Interior Adhesives: Maximum volatile organic compound content in accordance with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

2.3 ACCESSORIES

- A. Aluminum Frames, Trim and Components: Extruded aluminum; not less than 0.062 inch thick aluminum alloy; size and shape as indicated and to suite use and installation type; straight factory applied for factory assembled display units; single length extrusions when possible; keep joints to a minimum; concealed fasteners; miter corners to an aligned, hairline closure without sharp edges.
 1. Color:
 - a. Clear anodized aluminum.
- B. Map Supports: Formed aluminum sliding roller brackets, to fit map rail. Provide one pair of map supports for each markerboard type.
- C. Flag Holders: Formed steel bored to receive 1 inch diameter flag staff, bracketed to fit top rail of markerboard. Provide one flag holder for each markerboard type.
- D. Cleaning Instruction Plate: Provide instructions for markerboard cleaning on metal plate fastened to perimeter frame near Chalkrail.
- E. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that surfaces and conditions are ready to accept the work of this section. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Examine products to be installed for damage and other conditions detrimental to completion of the Work.
- D. Verify substrate construction and required internal wall blocking is sufficient and ready to receive Work.
- E. Verify that positioning dimensions are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install units as locations and heights as shown on the Drawings.
- C. Secure all work and factory assembled units level and plumb with concealed fastening hardware.
- D. Butt adjoining panels tight with concealed spline to hairline joint.

3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Cover markerboard surfaces with protective cover, taped to frame.
- C. Remove temporary protective cover at Final Inspection.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed construction from damage.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Room Identification Signs.
 - 2. Fire Protection Signs.
 - 3. Applied Vinyl Graphics.
 - 4. Notification Signs.
 - 5. Dimensional Letter Signs.
 - 6. Dedication Plaque.
 - 7. Warning Stencils.
- B. Related Requirements:
 - 1. Section 01 40 00 - Quality Requirements: Mockup requirements indicated in Schedule of Mockups at end of Section 01 40 00.
 - 2. Sections related to identification of Plumbing, HVAC and Electrical work.

1.2 REFERENCES

- A. American Iron and Steel Institute (AISI).
- B. American National Standards Institute (ANSI):
 - 1. ANSI Z97.1 - Safety Glazing Materials Used In Buildings – Safety Performance Specifications And Methods Of Test; 2015.
- C. Americans with Disabilities Act (ADA):
 - 1. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- D. ASTM International (ASTM):
 - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
 - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
 - 3. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
 - 4. ASTM E2072 - Standard Specification for Photoluminescent (Phosphorescent) Safety Markings; 2014.
- E. Code of Federal Regulations (CFR):
 - 1. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- F. International Code Council (ICC):
 - 1. ICC A117.1 - Accessible and Usable Building and Facilities; 2009.
- G. UL Standards (UL):
 - 1. UL 1994 - Luminous Egress Path Marking Systems; Current Edition, Including All Revisions.

1.3 DESIGN REQUIREMENTS

- A. Conform to current local and state building codes; ADA Standards; 36 CFR 1191; and ICC A117.1 guidelines for manufacture and installation of interior identification signs
- B. Conform to current International Fire Code requirements.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data describing the material, fabrication standards and characteristics of the sign systems indicated in the Section and other Contract Documents.
- C. Shop Drawings: Indicate sign types, styles, lettering font, copy, graphics, features, foreground and background colors, locations, overall dimensions of each sign and attachment method
- D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for each sign type; include color options for backgrounds, graphics and copy; submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 6 x 8 inches illustrating sign type, sign features, graphics and method of attachment. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Installation Instructions: Submit installation template and attachment devices.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Package signs, labeled in name groups.
- C. Store adhesive attachment tape at ambient room temperatures.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install signs when ambient temperature is lower than recommended by manufacturer.
- C. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.1 SIGNS

- A. Manufacturers:
 - 1. Acorn Sign Graphics.
 - 2. APCO Graphics.
 - 3. ASI Sign Systems.

4. Bayuk Graphic Systems, Inc.
5. Best Sign Systems.
6. Interface Architectural Signage, Inc.
7. InPro Corporation (Signscape).
8. Mohawk Sign Systems.
9. Rowmark, LLC
10. Scott Sign Systems, Inc.
11. Signage Industries Corporation.

2.2 COMPONENTS

- A. Room Identification Signs: Includes signs for rooms and area identification, unlighted exit signs, areas of refuge, and elevators and stairs related signs as indicated on Drawings.
 1. Photopolymer face fused to phenolic sheet (0.145 inch total thickness), matte finish.
 2. "Tactile" signage, with copy raised minimum 1/32 inch above sign surface using photopolymer bonded process and with Grade II Braille located below copy.
 3. Clear Window Insertion Slots: As indicated on Drawings.
 4. Copy and graphics to be uniformly opaque.
 5. Copy Font: Helvetica Medium, uppercase.
 6. Copy Height: As indicated on Drawings.
 7. Braille Height: As indicated on Drawings.
 8. Symbol Size: As indicated on Drawings.
 9. Total Thickness: As indicated on Drawings, but not less than 0.145 inch.
 10. Corners: Radiused, 1/2 inch.
 11. Edges: Beveled and smooth.
 12. Graphic Style: International type.
 13. Colors:
 - a. Background: As selected by Architect from submitted samples.
 - b. Copy:
 - 1) As selected by Architect from submitted samples.
 - c. Symbols and Graphics:
 - 1) As selected by Architect from submitted samples.
 14. Sign Types:
 - a. Drawings indicate Sign Type Designations, Size, Copy, Symbols and Insert Window requirements.
 - b. Signs required at all door openings and spaces and as indicated on Drawings.
 - c. Refer to Drawings and Signage Schedule therein.
 - d. Include five (5) additional identification signs with graphics to be determined during construction. Type to be the type with insert window.
 - e. Back Cover Plate: Where sign must be secured to glass, acquire Architect approval prior to fabrication and installation of a Backing Cover (blank solid sign) on the opposite side of the glass. The backing cover material shall match the size, shape, base color, thickness and finish of the sign. The intent is to hide the unsightly back view of the sign when viewed on the opposite side of the glass. (Back Cover Plate, also reference in INSTALLATION near end of this Section.)
- B. Fire Protections Signs:
 1. Size: As indicated on Drawings.
 2. Sign Types: Sign and Copy sizes vary; refer to Drawings.
 - a. Fire Department Connection Sign (2 required.) (Directional arrows as required.)
 - 1) Copy: **FDC**
 - b. Fire Sprinkler Riser Room Sign (2 required)
 - 1) Copy: **FIRE SPRINKLER RISER ROOM**

- c. Fire Alarm Control Panel Sign (2 required)
 - 1) Copy: **FACP**
- d. Fire Hose Valve Connection Sign (4 required; locations and final copy to be determined)
 - 1) Copy: **FIRE HOSE VALVE CONNECTION**
- 3. Characters: Style and copy as required by NCBC 2012 standards.
- 4. Engineering Grade (Type I) Reflective Aluminum: Red reflective lettering on white background, unless indicated otherwise on Drawings.
- 5. Comply with requirements of International Fire Code requirements.
- C. Applied Vinyl Graphics: 2 inches high, die-cut characters from vinyl film; 3 mils thick; pressure-sensitive adhesive backing; exterior applications grade adhesive.
 - 1. Provide door signs for each of the following:
 - a. Copy: **VISITORS REPORT TO MAIN OFFICE** (3 signs)
 - b. Copy: **TOBACCO FREE PROPERTY** (3 signs)
 - c. Copy: **DELIVERIES ONLY** (2 signs)
- D. Notification Signs: 1/8 inch thick, white plastic; 2 inch high black letters.
 - 1. Provide one (1) door sign.
 - a. Copy: **DELIVERIES ONLY**
- E. Dimensional Letter Signs: Metal; architectural grade aluminum.
 - 1. Exterior:
 - a. Thickness:
 - 1) 1 inch.
 - b. Height:
 - 1) Refer to Copy and Locations in following paragraphs.
 - c. Copy Style: Helvetica Medium, unless indicated otherwise on Drawings.
 - d. Finish: Brushed.
 - e. Copy and Locations: Characters to be designated by Architect.
 - 2. Interior:
 - a. Thickness:
 - 1) 1 inch.
 - b. Height:
 - 1) 8 inches, unless indicated otherwise on Drawings.
 - c. Copy Style: Helvetica Medium, unless indicated otherwise on Drawings.
 - d. Finish: Painted. Manufacturer's standard paint system; see drawings.
 - e. Copy:
 - 1) Copy: **DINING** (1 sign required)
 - 2) Copy: **SERVING LINE** (2 signs required)
 - 3) Copy: **GIRLS** (1 sign required)
 - 4) Copy: **BOYS** (1 sign required)
- F. Copy: Dedication Plaque: Cast bronze.
 - 1. Quantity: One.
 - 2. Size: 12 x 18 inches.
 - 3. Border: None.
 - 4. Finish: Pebble texture, oxidized finish.
 - 5. Letter Finish: Satin polish.
 - 6. Mounting: Standard concealed mounting to comply with the manufacturers written instructions for type of wall surface indicated.
 - 7. Characters: Style and copy to be selected by Architect and Owner from manufacturer's full range of options.
 - a. Plaque to include the following information:
 - 1) Project Name. To be determined by Architect and Owner.

- 2) Date of Construction.
 - 3) Names and Title of all the Board of Education Members.
 - 4) Name and Title of the School System Superintendent.
 - 5) Architect's Name and Location.
 - 6) General Contractor's Name.
- G. Warning Stencils: Reusable stencils for painting warning on both sides of rated walls, above hung ceiling.
1. Copy: **X-HOUR RATED WALL - PROTECT ALL OPENINGS** (X is to be the actual numeral that represents the wall fire rated time designation).
 2. Letter Color: Red.
 3. Letter Size: 3 inches tall.
 4. Spacing: Apply at a maximum of 30 feet o.c. and 15 feet from end of wall or at all rated walls less than 30 feet, above ceilings on both sides of walls.
 5. Quantity: Since stencils are reusable, quantity is determined by Contractor.

2.3 ACCESSORIES

- A. Mounting Hardware: Screws; stainless steel; countersunk phillips flat head screws.
- B. Tape Adhesive: Double sided foam tape; permanent adhesive.
- C. Back Cover Plate: Where sign must be secured to glass, acquire Architect approval prior to fabrication and installation of a Backing Cover (blank solid sign) on the opposite side of the glass. The backing cover material shall match the size, shape, base color, thickness and finish of the sign. The intent is to hide the unsightly back view of the sign when viewed on the opposite side of the glass. (Back Cover Plate, also reference in INSTALLATION near end of this Section.)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify substrate if finished to include finish coating(s).
- C. Verify adequate blocking and supports to structure are installed and ready to receive work.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install work at locations indicated on Drawings.
- C. Room Identification Signs: Mount with double sided foam tape and countersunk phillips flat head screws. Finish of screw heads is to match the color and finish of the portion of the sign that the screw is seated into.
 1. Position of Room Identification Signs:
 - a. All signage mounting heights must conform to accessibility requirements,

- specifically the height of Braille notations. Mount 9 inches from strike side of door to the center of the sign; on wall surface, level, 60" inches from the floor to the top of the sign.
- b. Where sign must be secured to glass, acquire Architect approval prior to fabrication and installation of a Backing Cover (blank solid sign) on the opposite side of the glass. The backing cover material shall match the size, shape, base color, thickness and finish of the sign. The intent is to hide the unsightly back view of the sign when viewed on the opposite side of the glass. (Back Cover Plate, also reference in COMPONENTS - Sign Types, in this Section.)
- D. Applied Vinyl Graphics: Mount on exterior of glass doors.
 - E. Dimensional Letter Signs: Mount with stainless steel threaded rods into expansion shields. All hardware shall be stainless steel.
 - F. Mount fire protection system signage in accordance with International Fire Code requirements.
 - G. Dedication Plaque: Mount with stainless steel threaded rods into expansion shields.

3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.

END OF SECTION

SECTION 10 21 15
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes solid plastic toilet compartments and urinal screens.
- B. Related Requirements:
 - 1. Section 10 28 13 - Toilet Accessories.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 286: Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on panel construction, hardware, and accessories.
- C. Shop Drawings: Indicate partition plans, door swings, elevation views, dimensions, details of wall and floor supports.
- D. Samples for Initial Selection: Two manufacturer's complete sets of color samples illustrating the full range of finishes and colors available. Submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples to be same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Installation Instructions: Include special procedures and perimeter conditions requiring special attention.

1.4 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with placement of support framing and anchors in wall.

PART 2 PRODUCTS

2.1 SOLID PLASTIC TOILET COMPARTMENTS

- A. Manufacturers:
 - 1. Accurate Partitions Corp.
 - 2. Columbia Partitions.
 - 3. Legacy Polymers.
 - 4. Metpar Corporation.
 - 5. Rockville Partitions Inc.

6. Scranton Products.
7. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

- A. Toilet Compartments: Solid, molded thermoset, and waterproof; high-density polyethylene (HDPE) plastic panels, doors, and pilasters.
 1. Fire Rating of HDPE Solid Plastic Panels: Class A in accordance with NFPA 286.
 2. Color:
 - a. As selected by Architect from submitted samples.
 3. Panels:
 - a. Thickness: 1 inch.
 - b. Width: As indicated on Drawings.
 - c. Height:
 - 1) As indicated on Drawings.
 4. Doors:
 - a. Thickness: 1 inch.
 - b. Width:
 - 1) Accessible (H/C) Compartment Doors: Out-swinging with opening clearance of 32 inches (with no obstructions). Coordinate with door thickness and hardware to ensure there are no obstructions within the required 32 inches clear opening.
 - 2) Standard Compartment Doors: 28 inches.
 - c. Height:
 - 1) Match compartment panels.
 5. Urinal Screens:
 - a. Thickness: 1 inch.
 - b. Width: Total projection from wall to be 23 inches. Dimension includes pilaster assembly where pilaster is indicated on Drawings.
 - c. Height:
 - 1) As indicated on Drawings.
 6. Pilasters:
 - a. Thickness: 1 inch.
 - b. Widths: As required to fit space and not less than 3 inches.
 - c. Height:
 - 1) As indicated on Drawings.

2.3 ACCESSORIES

- A. All finish metal components and accessories to be as follows, unless otherwise indicated:
 1. Satin Finish.
- B. Pilaster Shoe: Formed ASTM A666 Type 304 stainless steel, 3 inches high, concealing floor mounting and adjustment hardware. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. All metal mounting and adjustment hardware to be stainless steel.
- C. Head Rails: Hollow anodized aluminum tube, 1 x 1-5/8 inch size, with anti-grip profiles and cast socket wall brackets. Maximum lengths practical.
- D. Vertical Brackets: Double flange type.
 1. Extruded aluminum; color clear anodized.
 - a. Continuous length.
- E. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.

1. For attaching panels, screens, and pilasters to brackets: Binding Post through-bolts and nuts; tamper proof.
 2. For attaching all hardware: Binding Post through-bolts and nuts; tamper proof.
- F. Hardware: Heavy duty stainless steel:
1. Continuous hinges; self-closing.
 2. Sliding door latch.
 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 4. Coat hook with rubber bumper; one for each compartment, mounted on door.
 5. Furnish door pull on each side of door for out-swinging doors.
 6. Furnish metal heat sink at bottom of doors and partitions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify field measurements are as indicated on shop drawings.
- C. Verify correct spacing of and between plumbing fixtures.
- D. Verify correct location and adequate support of built-in framing, anchorage, and bracing.

3.2 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install work level and plumb.
- C. Attach panel brackets securely to support framing and anchor points using anchor devices.
- D. Attach panels and pilasters to brackets.
- E. Locate head rail joints at pilaster center lines.
- F. Adjust pilaster shoe leveling screws to produce level and plumb panel construction on sloped floors.

3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Indicated Position: 1/4 inch.
- C. Maximum Variation From Plumb: 1/8 inch.

3.4 ADJUSTING

- A. Section 01 73 00 - Execution: Adjusting.
- B. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- C. Adjust hinges to position in-swinging doors in partial open position (about 3 inches open) when unlatched. Return out-swinging doors to closed position.
- D. Adjust adjacent components for consistency of line or plane.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.
- B. Clean installed work in accordance with manufacturer's recommended materials and procedures.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.

END OF SECTION

SECTION 10 28 00
TOILET ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Toilet room accessories.
 - 2. Utility room accessories.
 - 3. Shower accessories.
- B. Related Requirements:
 - 1. Section 04 20 00 - Unit Masonry.
 - 2. Section 06 10 53 - Miscellaneous Rough Carpentry: Blocking in framed walls.
 - 3. Division 09 - Finishes: Sections describing wall materials and finishes.
 - 4. Division 10 - Specialties: Sections describing Toilet Compartments.
 - 5. Division 26 - Electrical: Construction related to electric devices.

1.2 REFERENCES

- A. Americans with Disabilities Act (ADA):
 - 1. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; current edition.
- B. ASTM International:
 - 1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service, 2015.
 - 3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 4. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar, 2015.
 - 5. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium, 2011.
 - 6. ASTM C1036 - Standard Specification for Flat Glass, 2016.
 - 7. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass, 2012.
 - 8. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror, 2008.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, attachment methods.
- C. Manufacturer's Installation Instructions: Submit special procedures, conditions requiring special attention.

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise acceptable to Architect. (Exception: Electric hand dryers.)

1.5 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work with placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.
- C. Coordinate electrical requirements with electrical service construction.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. All devices to be compliant with applicable codes and ADA standards.
- B. Manufactured and shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
 - 1. Grind welded joints smooth.
 - 2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
- C. Design grab bars, attachments, anchors and provide blocking to resist minimum 250 lb concentrated load applied at any point in any direction.
- D. Keys: Furnish two (2) keys for each accessory to Owner; master key lockable accessories.

2.2 TOILET AND BATH ACCESSORIES

- A. Manufacturers:
 - 1. Bradley Corporation.
 - 2. Bobrick Washroom Accessories.
 - 3. American Specialties, Inc. (ASI).
 - 4. Electric Hand Dryers:
 - a. Bobrick Washroom Accessories
 - b. Dyson
 - c. Excel Dryer, Inc.
 - d. Pinnacle Dryer Corporation.
 - 5. Substitutions: Section 01 60 00 - Product Requirements.

2.3 MATERIALS

- A. Stainless Steel Sheet: ASTM A666, Type 304.
- B. Stainless Steel Tubing: ASTM A269/A269M, Grad TP304 or TP 316.
- C. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- D. Zinc Alloy: Die cast, ASTM B86.
- E. Mirror Glass:
 - 1. Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- F. Adhesive: Two component epoxy type, waterproof.
- G. Fasteners, Screws, and Bolts: Stainless steel, tamper-proof, security type.
- H. Expansion Shields: Fiber, lead, stainless steel, or rubber as recommended by accessory manufacturer for component and substrate.

2.4 TOILET ROOM ACCESSORIES

- A. Toilet Tissue Dispenser (TD): Open roll type with both rolls accessible.
 - 1. Dual roll, surface mounted bracket type, satin finished cast aluminum brackets.
 - a. Controlled Delivery Type: To be in all stalls and toilets except ADA accessible stalls and toilets. Eccentric-shaped plastic spindles for 1/2 revolution delivery, designed to prevent theft of tissue roll.
 - 1) Basis of Design:
 - a) [Bobrick B-274](#) (surface mounted)
 - b. Non-Controlled Delivery Type: To be in all ADA accessible stalls and toilets. Eccentric-shaped plastic spindles, designed to prevent theft of tissue roll.
 - 1) Basis of Design:
 - a) [Bobrick B-2740](#) (surface mounted)
- B. Paper Towel Dispenser (PTD):
 - 1. In addition to locations indicated on Drawings, provide PTD at all sinks where PTD or EHD is not indicated.
 - 2. Folded paper type, stainless steel, hinged door with tumbler lock, .minimum capacity of 350 C-fold towels.
 - a. Basis of Design:
 - 1) [Bobrick B-262](#) (surface mounted, view slot)
 - 2) [Bobrick B-359](#) (recess mounted, no view slot)
- C. Soap Dispenser (SD):
 - 1. In addition to locations indicated on Drawings, provide SD at all sinks where SD is not indicated.
 - 2. Liquid soap dispenser; stainless steel body, back, lid and working parts; lid hinged and special key access; push type soap valve; window gage refill indicator; 40 ounces minimum capacity.
 - a. Basis of Design:
 - 1) [Bobrick B-4112](#) (surface mounted, horizontal tank)
- D. Framed Mirrors (MIR):
 - 1. Mirror Glass: 1/4 inch thick tempered mirror glass; ASTM C1048, abrasion-resistant coated mirror.
 - 2. Frame: Stainless steel; 3/4 inch angle shapes (0.05 inch thick); mitered and welded and ground corners; satin finish; tamperproof hanging system.
 - 3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and non-absorptive filler material.
 - 4. Size and Configuration: As indicated on Drawings.
 - 5. Basis of Design:
 - a. [Bobrick B-2908 Series](#).
- E. Grab Bars (GB):
 - 1. Stainless steel, 1-1/2 inch outside diameter, minimum 0.05 inch (18 gauge) wall thickness, safety grip peened grasping surface finish; concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
 - 2. Push/Pull Point Load: 250 pound-force (1112 N), minimum.
 - 3. Length and Configuration: As indicated on Drawings.
 - 4. Basis of Design:
 - a. [Bobrick B-6806.99](#) (1-1/2 O.D.)
- F. Sanitary Napkin Disposal Unit (SND):
 - 1. Stainless steel; self-closing door; locking bottom panel with full-length stainless steel piano-type hinge and removable receptacle.
 - 2. For thru-partition, 2 side access units, coordinate fit with toilet partition thickness.
 - 3. Basis of Design:
 - a. [Bobrick B-254](#) (surface mounted)

- b. [Bobrick B-353](#) (recess mounted)
 - c. [Bobrick B-354](#) (thru-partition, 2 sides)
- G. Electric Hand Dryers (EHD): Coordinate electrical requirements.
- 1. Stainless steel case; fan-in-case type; downward fixed nozzle.
 - 2. Operation: Automatic sensor-operated on and off; or pushbutton on and timer off.
 - 3. Basis of Design:
 - a. [Dyson Airblade db.](#) (surface mounted)
- H. Baby Changing Table (BCT):
- 1. Basis of Design:
 - a. [Bradley 963](#) Series: Plastic; color to be selected by Architect. (surface mounted)
- I. Coat Hook (CH): Solid aluminum casting, matte finish; rubber bumper protects wall and partition surfaces; 4 screws attachment base.
- 1. For toilet stall doors that swing into the stall, provide one (1) per each stall; locate inside stall door.
 - 2. For toilet stall doors that swing out of the stall, provide two (2) per each stall (one on the inside and one on the outside of door).
 - 3. Secure hooks with machine screws from hook side and pan head sleeve nuts (hex socket) from opposite end for thru-bolt assembly.
 - 4. Basis of Design:
 - a. [Bobrick B-212.](#)

2.5 SHOWER ACCESSORIES

- A. Grab Bars (GB):
- 1. Stainless steel, 1-1/2 inch outside diameter, minimum 0.05 inch (18 gauge) wall thickness, safety grip peened grasping surface finish; concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
 - 2. Push/Pull Point Load: 250 pound-force (1112 N), minimum.
 - 3. Length and Configuration: As indicated on Drawings.
 - 4. Basis of Design:
 - a. Bobrick Washroom Accessories.
- B. Shower Curtain Rod (SCR): Stainless steel tube, extra heavy duty; 1-1/4 inch outside diameter, 0.05 inch (18 gauge) wall thickness, satin-finished, with satin-finished stainless steel flanges, for concealed mounting.
- 1. Include shower curtain for each rod; opaque vinyl, 0.008 inch thick minimum, matte finish, with antibacterial treatment; flameproof and stain-resistant; 6 inches wider than rod length.
 - 2. Include shower curtain hooks with each shower rod and curtain; stainless steel Type 304 wire, pear-shaped; sized to fit curtain rod diameter.
 - 3. Basis of Design:
 - a. [Bobrick B-6047 Series](#) (curtain rod)
 - b. [Bobrick 204 Series](#) (curtain)
 - c. [Bobrick 204-1](#) (curtain hooks)
- C. Robe Hook (RH): Stainless steel; single prong; rectangular-shaped hook; satin finish; concealed mounting with vandal resistant escutcheon.
- 1. Provide one (1) per each shower; locate outside stall on wall 16 inches from stall.
 - 2. Basis of Design:
 - a. [Bobrick B-76717.](#)

- D. Wall-Mounted Soap Dish (WSD): Heavy duty, one-piece stainless steel, two ridges holds soap with drain holes; surface-mounted; satin finish; concealed mechanical fastening suitable for substrate.
 - 1. Basis of Design:
 - a. [Bobrick B-6807](#).
- E. Shower Seat (SS): Folding type; surface wall-mounted; welded tubular seat frame, structural support members, hinges and mechanical fasteners of Type 304 stainless steel, rectangular seat; supports 500 lbs, minimum.
 - 1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of color as selected by Architect.
 - 2. Basis of Design:
 - a. [Bobrick B-5191](#).

2.6 UTILITY ROOM ACCESSORIES

- A. Mop and Broom Holder (MH): 0.05 inch thick (18 gage), Type 304 stainless steel.
 - 1. Mop Holders: Four (4) spring-loaded rubber cam holders, holds mops 8 inches from wall.
 - 2. Shelf: 18 gage, 8 inches deep.
 - 3. Rag Hooks: One each, midway between mop holders.
 - 4. Length: 36 inches.
 - 5. Basis of Design:
 - a. [Bobrick B-224 x 36](#).
- B. Mop Sink Wall Splash Guard: 16 gage, Type 304 Stainless steel.
 - 1. Provide wall guard at each mop sink in project.
 - 2. 24 inches high from top rim of mop sink.
 - 3. Fabrication: Custom fit to wall configuration; one piece fabrication; configured to protect all wall surfaces adjacent to mop sink rim; all edges to be single hemmed; corners to be ground smooth.
 - 4. Fasteners: Stainless steel, low profile pan head screws with EPDM bonded seal washer.
 - 5. Installation: Ensure that mop sink rim has been fully sealed to wall prior to installation of wall guard. At frame walls, ensure that adequate blocking is behind wall finish to engage with fasteners. Bottom of wall guard to be 1/8 inch above mop sink rim (allowing gap for application of sealant bead). After attaching wall guard to wall, apply sealant around entire perimeter of wall guard.

2.7 FACTORY FINISHING

- A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, Type SC 2 polished finish, unless otherwise noted.
- C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.
- D. Powder-Coated Steel: Clean, degrease, and neutralize. Follow immediately with a phosphatizing treatment, prime coat, and two finish coats of powder coat enamel.
- E. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices; minimum 1.2 oz/sq ft coating thickness; galvanize after fabrication.
- F. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.
- G. Back paint components where contact is made with building finishes to prevent electrolysis.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that internal wall reinforcement and reinforcement of toilet partitions, to receive anchor attachments, is installed and adequate to attach the work securely.
- D. Coordinate electrical requirements with electrical service construction.
- E. Verify field measurements are as indicated on product data instructed by manufacturer.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment used during installation.
- C. Deliver inserts and rough-in frames to site for timely installation.
- D. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights and Locations: As required by accessibility regulations and as indicated on Drawings.

3.4 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust and test installed Work for proper functionality.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean installed Work and comply with manufacturer's recommendations.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed Work from damage.

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fire extinguishers.
 - 2. Fire extinguisher cabinets.
 - 3. Accessories.
- B. Related Requirements:
 - 1. Section 04 20 00 - Unit Masonry.
 - 2. Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCE STANDARDS

- A. Factory Mutual (FM):
 - 1. FM (AG) - FM Approval Guide; current edition.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 10 - Standard for Portable Fire Extinguishers; 2017.
- C. Underwriters Laboratories Inc. (UL):
 - 1. UL (DIR) - Fire Protection Equipment Directory.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
 - 1. Submit extinguisher operational features; full range of colors and finishes; anchorage details.
 - 2. Submit cabinet product data; operational features; full range of colors and finishes; anchorage details.
- C. Shop Drawings:
 - 1. Indicate mounting measurements for brackets; locations and fire ratings.
 - 2. Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, installation measurements for cabinets; locations and fire ratings.
- D. Manufacturer's Installation Instructions: Submit special criteria and wall opening coordination requirements.
- E. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 78 23 - Operation and Maintenance Data.
- B. Operation and Maintenance Data: Submit test, refill or recharge schedules and re-certification requirements.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

- B. Do not install extinguishers when ambient temperature is capable of freezing extinguisher ingredients.

PART 2 PRODUCTS

2.1 FIRE EXTINGUISHERS

- A. Manufacturers:
 - 1. General Fire Extinguisher Corp.
 - 2. Grinnell Corp.
 - 3. J. L. Industries.
 - 4. Kidde Fire Extinguishers.
 - 5. Larsen's Manufacturing Co.
 - 6. Nystrom Products Co.
 - 7. Potter Roemer.
 - 8. Substitutions: Section 01 60 00 - Product Requirements.
- B. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- C. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
 - 1. Class: A:B:C type.
 - 2. Size: 10 pounds.
 - 3. Finish: Baked polyester powder coat, red color.
 - 4. Temperature range: Minus 40 degrees F to 120 degrees F.
- D. Wet Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gage.
 - 1. Class: K type.
 - 2. Size: 1.8 gallons.
 - 3. Finish: Polished stainless steel.
 - 4. Temperature range: Minus 20 degrees F to 120 degrees F.

2.2 FIRE EXTINGUISHER CABINETS

- A. Manufacturers:
 - 1. J. L. Industries - Academy Series. (Basis of Design)
 - 2. Larsen's Manufacturing Co.
 - 3. Nystrom Products Co.
 - 4. Potter Roemer.
 - 5. Substitutions: Section 01 60 00 - Product Requirements.
- B. Fire Extinguishers Cabinets - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide fire extinguisher cabinets classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.
- C. Metal:
 - 1. Formed aluminum; 0.036 inch thick base metal.
- D. Cabinet Configuration:
 - 1. Semi-recessed Type:
 - a. Projected Trim: Returned to wall surface, with 1-1/2 inch projection, and 1-1/2 inch wide face.
 - 2. Size: To be as required to accommodate required extinguisher device and accessories.

- a. Minimum Size: To be used where required extinguisher device and accessories do not require larger size.
 - 1) Tub Nominal Dimensions: 10-1/2 inch wide x 24 inches high x 5-1/2 inches deep.
- E. Door: 5/8 inch thick, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinge. Pull to be surfaced mounted handle type with two through-door bolts.
- F. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.
 - 1. Full door glazed panel.
- G. Door Signage:
 - 1. Vinyl, self adhering, diecut letters; all uppercase helvetica font; vertical descending composition.
 - a. White color and reverse for application on inside face of door glazing panel.
- H. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors; no visible fasteners on exterior of cabinet.
- I. Weld, fill, and grind components smooth.
- J. Finish of Cabinet Exterior Trim and Door:
 - 1. Clear anodized finish.
- K. Finish of Cabinet Interior:
 - 1. Match exterior trim and door.

2.3 ACCESSORIES

- A. Extinguisher Brackets:
 - 1. Formed stainless steel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify locations and mounting heights for each unit.
- C. Verify rough openings for cabinets are correctly sized and located.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install cabinets plumb and level in wall openings and as indicated on Drawings.
- C. Install wall brackets at location indicated on Drawings.
- D. Secure rigidly in place.
- E. Place extinguishers and accessories in cabinets or on wall brackets as indicated on Drawings.

3.4 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work in accordance with manufacturer's recommendations including cleaning procedures and materials.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.

3.6 SCHEDULES

- A. Corridors: Cabinets with Type A:B:C fire extinguishers placed inside.
- B. Mechanical Rooms: Type A:B:C fire extinguishers mounted on brackets.
- C. Kitchens: Type K and Type A:B:C fire extinguishers mounted on brackets
- D. Elevator Equipment Rooms: Type A:B:C fire extinguishers mounted on brackets.
- E. Lawn Equipment Sheds: Type A:B:C fire extinguishers mounted on brackets.
- F. Auditorium and Auditorium Lobby: Cabinets with Type A:B:C fire extinguishers placed inside.

END OF SECTION

SECTION 10 51 13
METAL LOCKERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes factory manufactured metal lockers and accessories.
 - 1. Kitchen Staff Lockers.

1.2 REFERENCES

- A. Americans with Disabilities Act (ADA):
 - 1. ADA Accessibility Guidelines; Current Edition.
- B. ASTM International:
 - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate locker plan layout, elevations, filler panels, ADA compliant lockers, numbering plan, and combination lock code.
 - 1. Indicate layout and dimensions for locker benches.
- C. Product Data: Submit data on locker types, sizes, and accessories.
- D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Installation Instructions: Submit installation template and attachment devices.

1.4 DELIVERY, STORAGE, AND PROTECTION

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect components and accessories from warping, moisture and other damage.

PART 2 PRODUCTS

2.1 LOCKERS

- A. Manufacturers:
 - 1. Art Metal Products.
 - 2. ASI Storage Solutions, Inc.
 - 3. List Industries, Inc.
 - 4. Lyon Metal Products, Inc.
 - 5. Penco Products, Inc.

6. Republic Storage Systems Co., Inc.
7. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

- A. Factory assembled, made of formed sheet steel, ASTM A653/A653MSS Grade 33/230, with G60/Z180 coating, stretcher leveled; metal edges finished smooth without burrs
 1. Metal finish to be powder coat baked enamel on all surfaces and components.
 - a. Finish thickness:
 - 1) 1 mil thickness.
 2. Color: To be selected by Architect from manufacturer's full range.
- B. Free-Standing Units: For free-standing locker units or groups, provide components and units capable of being securely anchored to floor.

2.3 LOCKER TYPES

- A. Kitchen Staff Lockers:
 1. Sides, Bottom, Top, and Shelf: 16 gauge.
 2. Back: 18 gauge.
 3. Doors Face and Frame: 14 gauge.
 4. Hinges: 0.074 inch thick.
 5. Base and Trim: 18 gauge.
 6. Accessories:
 - a. Two (2) double prong wall hooks.
 - b. Rubber bumpers.
 - c. Metal plate formed shelf.

2.4 FABRICATION

- A. Locker Units:
 1. Width:
 - a. All lockers, unless indicated otherwise: 12 inches.
 2. Depth:
 - a. All lockers, unless indicated otherwise: 15 inches.
 3. Height: The following measurements apply, unless indicated otherwise on Drawings.
 - a. Kitchen Staff Lockers: 72 inches; double tier; sloped top.
 4. Base Mounting:
 - a. Concrete Base with face finish to match adjacent wall base in room:
 - 1) Kitchen Staff Lockers.
 5. Base Height: 6 inches, unless indicated otherwise on Drawings.
 6. Locking: Equipped for built-in combination locks; master controlled keyed; with five change capability.
 7. Ventilation Method:
 - a. Door louvers vents at upper and lower portion of door.
 - 1) Kitchen Staff Lockers.
 8. Class: Conventional.
 9. Configuration: Refer to drawing elevations for locker configurations.
- B. Locker Body:
 1. Formed and flanged; with steel stiffener ribs; electric spot welded.
 2. Provide finished heavy gauge steel end panel for exposed end lockers.
- C. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.

- D. Doors: Hollow channel construction, 1-3/16 inch thick; welded construction, channel reinforced top and bottom with intermediate stiffener ribs, grind and finish edges smooth.
- E. Hinges: Two for doors under 42 inches high; three for doors over 42 inches high; weld securely to locker body and door.
- F. Door Number Plates: Provide rectangular shaped aluminum plates. Form numbers 3/8 inch high of block font style, in contrasting color. Provide ADA designation for ADA compliant lockers
- G. Latches and Locks: Recessed formed stainless steel.
- H. Finish edges smooth without burrs.
- I. Provide metal top, end, closure, and filler panels; 16 gauge.
- J. ADA Compliance: Applies to all locker indicated as ADA compliant.
 - 1. Comply with ICC A117.1 and ADA Standards.
 - 2. Decal with international symbol of accessibility on face of locker.
 - 3. Shelves: Adjustable type.
 - 4. Latches and Locks:
 - a. Recessed and with key with ADA compliant key grip.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that conditions, finishes, substrates and anchoring construction are adequate and acceptable to receive Work of this Section.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install lockers plumb and square. Joints between adjacent surfaces to be flush hairline joints.
- C. Secure lockers with anchor devices to suit substrate construction.
 - 1. Minimum Pullout Force: 100 lb.
- D. Bolt adjoining locker units together to provide rigid installation.
- E. Install finished accessories, end panels, filler panels, and bases.
- F. Replace components that are damaged, not fitting properly or not operating smoothly.

3.4 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust doors and latches to operate smoothly and without binding.
- C. Adjust built-in locks (if any) to operate smoothly and without binding of dial or key.

- D. Touch-up with factory-supplied paint and repair or replace damaged products before substantial completion.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean locker interiors and exterior surfaces.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect the Work from damage.

END OF SECTION

SECTION 10 56 15
METAL STORAGE SHELVING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal storage shelving units.
- B. Related Requirements:
 - 1. Section 11 40 00 - Food Service Equipment: Wire shelving for food storage.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for all components.
- C. Shop Drawings: Indicate shelving units and components layout for each location and anchorage.
- D. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied finishes; submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final Work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Manufacturer's Installation Instructions: Indicate special precautions for installation.

1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three (3) years documented experience.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept components on site in manufacturer's original packaging. Inspect for damage.

PART 2 PRODUCTS

2.1 METAL STORAGE SHELVING

- A. Manufacturers:
 - 1. Lyon Workspace Products.
 - 2. Penco Products.
 - 3. Spacesaver.
 - 4. Tensco Corp.
 - 5. Substitutions: Section 01 60 00 - Product Requirements.

- B. Product Description: Metal Storage Shelving: Factory-formed, field-assembled, freestanding, upright metal storage shelving system; designed for shelves to span between and be supported by corner posts, with shelves adjustable over the entire height of shelving unit.

2.2 COMPONENTS

- A. Posts: Tubular L-shaped and T-shaped, cold-rolled steel, 16 gage thick, punched on 1-1/2 inch centers.
- B. Shelves: Box formed edges, 20 gage thick galvanized steel.

2.3 ACCESSORIES

- A. Shelf Clips: Hot-rolled steel, 12 gage thick, one piece construction.
- B. Sides and Backs:
 - 1. Solid steel panels; 24 gage thick galvanized steel.

2.4 FABRICATION

- A. Fabricate shelves with turned down box edges with return flange spot welded to bottom of shelf.
- B. Fabricate shelves 48 inches long by 24 inches deep, unless indicated otherwise on Drawings.
- C. Overall Unit Height:
 - 1. 84 inches.

2.5 FACTORY FINISHING

- A. Manufacturer's standard baked enamel finish.
 - 1. All metal components and accessories.
 - 2. Colors:
 - a. As selected by Architect from submitted samples.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify dimensions, tolerances, and methods of attachment with other Work.
- C. Verify spaces are ready to receive Work of this Section.

3.2 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install components according to manufacturer's written instructions, using fasteners appropriate to substrate indicated and recommended by manufacturer.
- C. Install units level, plumb, and firmly anchored.
- D. Anchor units to back wall to prevent tip-over.

3.3 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.

- B. Replace damaged or defective components.
- C. Remove temporary labels and protective coatings.
- D. Clean exposed surfaces.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect shelving from damage.

END OF SECTION

SECTION 10 73 16

CANOPIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Factory finished metal canopies suspended from building face structure.
- B. Related Requirements:
 - 1. Section 10 73 26 - Walkway Coverings: Coverings supported by columns.

1.2 REFERENCES

- A. American Architectural Manufacturers Association:
 - 1. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
 - 2. AAMA 2605 - Voluntary Specification, Performance Requirements And Test Procedures For Superior Performing Organic Coatings On Aluminum Extrusions And Panels, 2005.
- B. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- C. ASTM International:
 - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
 - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- D. American Welding Society, Inc. (AWS)
 - 1. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Manufacturer's product information, specifications and installation instructions for components and accessories.
- C. Shop Drawings: Indicate system and component profiles, sizes, connection attachments, anchorage, size and type of fasteners; anticipated deflection under load; affected related work; expansion and contraction joint locations and details; drainage details and flow diagrams; field welding; and accessories.
 - 1. Prepare shop drawings indicating attachment system, framing, transverse cross sections, covering and trim details, and installation details to clearly indicate proper assembly of components.
 - 2. Shop drawings and engineering data indicating compliance with requirements of this Section are to be designed and sealed by a licensed professional Engineer. Include test results of previous testing meeting performance criteria, and other supportive data.
- D. Engineering Certification: Submit written certification prepared and signed by a licensed professional Engineer indicating compliance with applicable codes and Performance Requirements indicated in this Section.

- E. Samples for Initial Selection: Two manufacturer's color charts illustrating the full range of finishes and colors available for products with factory-applied color finishes; submit for Architect's initial selections.
- F. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish and color; samples on same product material type indicated for final work; each sample 4 x 4 inches. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1.4 QUALITY ASSURANCE

- A. Designer Qualifications: Design of canopy systems included in this Section are to be designed and sealed by a licensed Professional Engineer, experienced in design of work of this type and licensed in the State in which the Project is located. Engineer is to certify that all applicable code requirements have been met. Engineer may be in the employ of the manufacturer of the covering systems, provided Engineer is compliant with the above registration requirement.
- B. Comply with the current provisions of the following except as otherwise indicated:
 - 1. Applicable codes and authorities having jurisdiction (AHJ)
 - 2. AWS (American Welding Society) standards for structural welding.
- C. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five (5) years documented experience.
- D. Installer Qualifications: Company specializing in performing the work specified in this Section with minimum five (5) years documented experience.
- E. Single Source Requirement: If project includes Section 10 73 16 - Canopies and Section 10 73 26 - Walkway Coverings, manufacturer to be same and installer to be same for both Sections.
- F. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to insure proper fitting of work.
- G. Coordination: Coordinate work of other Sections that interface and are related to the work of this Section (drainage, sidewalks, curbs, building openings, exterior walls, roofing, soffits, fascia, lighting, etc.).

1.5 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Product warranties.
- B. Provide five (5) year manufacturer's warranty for finish.
- C. Provide manufacturer's standard one (1) year warranty that includes, but is not limited to, coverage for structural performance, water tightness and finish.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Design system and size components, and anchorage to safely withstand Live Loads, Snow Loads, Wind Loads (+ and -), and Seismic Loads as indicated on Drawings for the Structural Design Criteria and in compliance with ASCE 7 and the State Building Code for the State in which the project is located.

- B. System to provide for expansion and contraction within system components caused by a cycling temperature range of 120 degrees F without causing detrimental effects to system or components.
- C. System to accommodate, without damage to system or components, movement within system, movement between system and perimeter framing components, dynamic loading and release of loads, and deflection of structural support framing.
- D. Conform to applicable code for fire resistance ratings for items.

2.2 MANUFACTURERS

- A. Dittmer Architectural Aluminum.
- B. Mitchell Metals.
- C. Mapes Architectural Products.
- D. Peachtree Protective Covers. (Basis of Design)
- E. Perfection Architectural Systems, Inc.
- F. Tennessee Valley Metals, Inc., East Coast TVM.
- G. Substitutions: Section 01 60 00 - Product Requirements.

2.3 MATERIALS

- A. Extruded Aluminum: ASTM B221; 6063 alloy, heat treated to T-6 temper.
- B. Sheet Aluminum: ASTM B209; 6061 alloy, heat treated to T6 temper.
- C. Fasteners:
 - 1. Deck Screws (rivets not permitted): Type 18-8 non-magnetic stainless steel sealed with a neoprene "O" ring beneath 5/8 inch outside dimension, conical washer.
 - 2. Rivets: Size 3/16 x 1/2 inch grip range aluminum rivets with aluminum mandrel.
 - 3. Bolts: All bolts, nuts, and washers to be 18-8 non-magnetic stainless steel.
 - 4. Tek Screws: Not permitted.

2.4 COMPONENTS

- A. Decking: Extruded self-flashing aluminum sections; interlocking into a watertight composite unit. Extrusion thickness to be a required to withstand imposed loads.
- B. Soffit Type: Flush bottom, unless indicated otherwise on Drawings.
- C. Fascia: Extruded aluminum.
 - 1. For integral fascia and structural frame extrusion, 0.125 inch thick, minimum.
 - 2. For separate fascia extrusion secured to structural frame, 0.050 inch thick, minimum.
 - 3. Shape and size to be as indicated on Drawings.
- D. Flashing: Extruded aluminum, 0.040 inch thick; same finish as for system components; secured with concealed fastening method.

2.5 FABRICATION

- A. Fabricate assemblies to comply with design as indicated on Drawings.
- B. Fit and shop assemble components in largest practical sizes, for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide allowance for expansion and contraction of entire system.
- D. Provide drainage pathway without leaks and to point of drainage discharge.

- E. For canopies suspended from building (and without columns for drainage), provide for drainage openings with water diverters along bottom of canopy outer edge member. Drainage openings to be as indicated on Drawings. If drainage openings are not indicated on Drawings, locate drainage openings away from building face and not in direct line of door openings.
- F. Arrange fasteners, attachments and jointing to ensure concealment from view.
- G. Supply components required for anchorage of framing. Fabricate anchors and related components of same material and finish as framing, except where specifically noted otherwise.
- H. Continuously seal joined pieces by continuous welds.
- I. Welding In accordance with ANSI/AWS D1.2/D1.2M.
- J. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, hairline and waterproof. Ease exposed edges to small uniform radius.
- K. Accurately form components to suit each other and to building structure.
- L. Deck Construction: Deck shall be manufactured of extruded modules that interlock in a self-flashing manner. Interlocking joints shall be positively fastened at not less than 18 inches o.c. creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Deck shall be assembled with sufficient camber to offset dead load deflection.

2.6 ACCESSORIES

- A. Fittings: Elbows, T-shapes, wall brackets; cast aluminum.
- B. Splice Connectors: Concealed spigot; cast aluminum.
- C. Struts: Manufacturer's standard rod type and material.
- D. Wall Brackets: Manufacturer's standard decorative type for mounting in wall structure, unless shape, profile, or configuration is otherwise indicated on Drawings.
- E. Exposed Fasteners: Flush countersunk stainless steel screws, bolts and rivets; finish to be same as factory finish indicated.
- F. Protective Coating for dissimilar materials: Clear acrylic; two coats; compatible with materials to be coated.

2.7 FACTORY FINISHING

- A. All surfaces of components, fabrications, and accessories to be factory finished to match colors selected by Architect from full range of colors.
- B. High performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions
 1. Fluoropolymer Three-Coat Coating System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605. Color as selected by Architect from submitted samples.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify that substrates and anchor conditions are acceptable and are ready to receive work.
- C. Verify dimensions, tolerances, and method of attachment with other work.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install as indicated on Drawings and in accordance with Engineer's and manufacturer's instructions.
- C. Install components plumb and level, accurately fitted, free from distortion or defects.
- D. Apply two coats of clear acrylic coating to aluminum surfaces in contact with dissimilar materials and cementitious embedment. Application to be concealed from view.
- E. Install anchors required for connecting framing to structure.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.
- C. Maximum Misalignment from True Position: 1/4 inch.
- D. Maximum Variation from Plane: 1/4 inch every 10 feet, non-cumulative.
- E. Maximum Variation from Alignment of Two Adjoining Members Abutting in Plane: 0.015 inch.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Clean installed work and comply with manufacturer's recommendations.
- B. Clean installed work in accordance with manufacturer's recommended materials and procedures.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protect installed construction.

END OF SECTION

SECTION 11 30 13
RESIDENTIAL APPLIANCES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes residential appliances with installation including connections to utilities.
- B. Related Requirements:
 - 1. Division 22 - Plumbing: Coordinate equipment plumbing requirements.
 - 2. Division 23 - HVAC: Coordinate equipment venting requirements.
 - 3. Division 26 - Electrical: Coordinate equipment electrical requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
 - 2. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA LD 3 - High Pressure Decorative Laminates.
 - 2. NEMA MG 1 - Motors and Generators.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- D. Sheet Metal and Air Conditioning Contractors (SMACNA):
 - 1. SMACNA - Kitchen Equipment Fabrication Guidelines.
- E. Underwriters Laboratories Inc. (UL):
 - 1. UL - Electrical Appliance and Utilization Equipment Directory.
- F. U.S. Environmental Protection Agency:
 - 1. ENERGY STAR - Energy Star Voluntary Labeling Program.

1.3 COORDINATION

- A. Coordinate plumbing, venting, and electrical work with requirements of appliances.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on appliances; indicate configuration, sizes, materials, finishes, locations, and utility connections and locations.
- C. Shop Drawings:
 - 1. Indicate in large scale detail, fabricated equipment showing construction methods, types and gages of metal, hardware and fittings, plan, front elevation, minimum of one cross-section. Indicate verification that the projects planned provisions for utilities, ventilation and connectivity are compliant with the requirements of the appliance and/or device, to include types, sizes, locations and accessibility.
 - 2. Illustrate complicated parts of typical items in cut-away perspective.

3. For control systems, indicate service connections, characteristics, and wiring diagrams.
- D. Samples: Submit samples illustrating manufacturer's full range of color and finish options for selection by Architect.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
 1. Certify residential appliances are Energy Star labeled.
- F. Manufacturer's Installation Instructions: Submit special procedures for built-in items and perimeter conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 77 00 - Closeout Procedures.
- B. Operation and Maintenance Data: Submit manufacturer's operating instructions for specified equipment and care and maintenance of finished surfaces.

1.6 QUALITY ASSURANCE

- A. All residential appliances to have Underwriters Laboratories, Inc. (UL) label.
- B. Do not use HCFC based refrigerants or Halon extinguishing agents.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Store products clear of floor in manner to prevent damage.
- C. Coordinate size of access and route to place of installation.

PART 2 PRODUCTS

2.1 RESIDENTIAL APPLIANCES

- A. Manufacturers:
 1. Basis of Design: Indicated in Schedule at end of this Section.
 2. Whirlpool Corporation.
 3. General Electric Company.
 4. Maytag.
 5. LG Electronics.
 6. KitchenAid.
 7. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

- A. Refer to schedule at end of this Section.
- B. Provide rough-in hardware, supports and connections, attachment devices, closure trim, and accessories.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

- B. Verify plumbing, electrical and venting service connection requirements.
- C. Verify supports and anchorage construction is correct and in required locations.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Insulate to prevent electrolysis between dissimilar metals.
- C. Use anchoring devices appropriate for equipment and expected usage.

3.4 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust equipment and apparatus to ensure proper working order and conditions.
- C. Remove and replace equipment creating excessive noise or vibration.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Remove masking or protective covering from stainless steel and other finished surfaces.
- C. Wash and clean equipment.
- D. Polish glass, plastic, hardware, accessories, fixtures, and fittings.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect installed Work from damage.

3.7 SCHEDULES

- A. Basis of Designs: As indicated.
- B. Stacked Washer/Dryer Combo (Unitized space saver):
 - 1. GE - Unitized Spacemaker 3.2 DOE cu. ft. Washer and 5.9 cu. ft. Electric Dryer - Model GUD27ESSJWW; Color: White.

END OF SECTION

SECTION 11 40 00

FOOD SERVICE EQUIPMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The general provisions of the contract including general and supplementary conditions and general requirements apply to the work specified in this section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Plumbing: Refer to Division 22, including:
 - 1. Rough-in piping for water supply and waste lines.
 - 2. Piping for supply and waste lines.
 - 3. Traps, grease traps, line strainers, tail pieces, valves, stops, shut-offs and miscellaneous fittings required for complete installation.
 - 4. Final connections.
 - 5. Indirect drains for sink compartments.
- B. Mechanical: Refer to Division 23.
 - 1. Roof mounted fans and connecting ductwork not shown as part of the kitchen equipment.
 - 2. Final connections, including approved welded duct connections to hoods.
- C. Electrical: Refer to Division 26, including:
 - 1. Rough-in conduit, wiring, line and disconnect switches, safety cut-offs and fittings, control panels, fuses, boxes and fittings required for complete installation.
 - 2. Final connections, including mounting and wiring of switches furnished as part of the food service equipment (unless otherwise indicated on the drawings).

1.3 WORK INCLUDED THIS SECTION:

- A. Furnish and install all food service equipment as specified herein, including that which is reasonably inferred, with all related items necessary to complete work shown on contract drawings and/or required by these specifications.
- B. Electrical Work:
 - 1. Interwiring of food service equipment between components within equipment, such as heating elements, switches, thermostats, motors, etc., complete with junction box as is applicable, ready for final connection.
 - 2. Voltages shall be as indicated on contract drawings. Any differences in electrical characteristics at job site from those shown on contract documents must be submitted to Architect for consideration prior to ordering equipment.

- C. Plumbing Work:
 - 1. Furnish all equipment with faucets, sink waste assemblies, and trim as specified in this section.
 - 2. Other than sink compartments, extend all indirect waste lines to nearest floor receptor. All such drain lines to be properly sized. Drain shall terminate with proper air gap above flood rim of floor receptor. Drain lines to be copper with silver paint unless specified otherwise. Drain lines in public areas to be chrome plated where exposed to view.
- D. Mechanical Work:
 - 1. Exhaust hoods by mechanical with connection collars ready for final connection by HVAC Section.

1.4 QUALITY ASSURANCE

- A. It is required that all custom fabricated equipment such as food serving units, tables, sinks, counter tops, etc., be manufactured by a food service equipment fabricator who has the plant, personnel and engineering equipment required. Such manufacturer shall be subject to approval of Architect.
All work in above category shall be manufactured by one manufacturer, and shall be of uniform design and finish.
- B. Manufacturer of this equipment must be able to show that he is now and for the past five years has been engaged in manufacture or distribution of equipment, as required under this contract, as his principal product.
- C. Manufacturer of equipment herein specified shall be a recognized distributor for items of equipment specified herein which are of other manufacture than his own.
- D. Only manufacturers who can meet the foregoing qualifications will be acceptable.
- E. All work shall be done in an approved workmanlike manner, to the complete satisfaction of the owner.

1.5 SUBMITTALS

- A. Submit shop drawings as required by General Conditions.
All shop drawings and rough-in drawings shall be CAD drafted. Hand drawings are not acceptable.
- B. Shop drawings and bound brochures covering manufactured or "buy-out" items covering all work and equipment included in this contract shall be submitted to Architect as soon as possible after award of contract. After approval, Food Service Equipment Contractor shall furnish to Architect sets of shop drawings and brochures, corrected as required by virtue of review comments, for distribution to various interested trades on project. All costs of reproduction and submission shall be part of contract.
- C. Provide fully dimensioned rough-in plans at 1/4" scale, consisting of a separate drawing for each discipline. Each drawing shall show equipment shaded down 50%. Rough-in set shall include all required mechanical, electrical, plumbing, services for equipment and dimensioned rough-in location for same. Rough-in locations shown shall make

allowances for required traps, switches, etc., thereby not requiring interpretation or adjustment on the part of other Contractors. Drawings shall indicate dimensions for floor depressions, wall openings, etc., for equipment.

Food Service Equipment Contractor shall visit site to verify all rough-in and sleeve locations prior to installation of finished floors, and shall cooperate with other Contractors involved in proper location of same. Food Service Equipment Contractor shall be responsible for any required relocations of rough-in due to errors or inaccuracies on those rough-in plans which he prepares.

- D. Rough-in plans shall include all required services which relate to equipment but which may not directly connect thereto, such as convenience outlets at walls, hose stations, floor drains, etc.
- E. Rough-in plans shall also include all required outlet services for equipment which is designated on drawing schedule, even though such equipment may not be included in this contract.
- F. Fully dimensioned and detailed shop drawings of custom fabricated equipment items shall be submitted, drawn at 3/4" and 1 - 1/2" scale for plans, elevations and sections respectively.
Drawings shall show all details of construction, installation, and relation to adjoining and related work where cutting or close fitting is required. Drawings shall show all reinforcements, anchorage, and other work required for complete installation of all fixtures.
- G. Do not begin fabrication of custom manufactured equipment until approvals of shop drawings have been received and until field measurements have been taken by Food Service Equipment Contractor, where such measurements are necessary to assure proper conformance with intent of contract drawings and specifications.
- H. Make field measurements, giving due consideration to any architectural, mechanical, or structural discrepancies which may occur during construction of building. No extra compensation will be allowed for any difference between actual measurements secured at job site and dimensions indicated on contract drawings. Any differences which may be found at job site during field measurements shall be submitted to Architect for consideration before proceeding with fabrication of equipment.
- I. Submit illustrative brochures for manufactured or "buy-out" equipment items, complete with illustrations, specifications, line drawings, rough-in requirements, and list of accessories or other specified additional requirements. Brochures shall be bound and shall include data on all equipment which is to be provided, arranged in numerical sequence which conforms to item numbers of specifications. Omission of data does not reduce obligation to provide items as specified.
- J. Approval of shop schedules and brochures will be in general and shall be understood to mean that Architect has no objection to use of materials or processes shown. Approval does not relieve Food Service Equipment Contractor from responsibility for errors, omissions, or deviations from contract requirements.

1.6 SUBSTITUTIONS - STANDARDS

- A. Refer to Instructions to Bidders and Division 01 for requirements.

1.7 DRAWINGS

- A. Drawings which constitute part of contract documents indicate general arrangement of piping and location of equipment. Should it be necessary to deviate from arrangement indicated in order to meet structural conditions, make such deviations without expense to Owner.
- B. Specifications and drawings are reasonably exact, but their extreme accuracy is not guaranteed. Drawings and specifications are for assistance and guidance of Contractor, and exact locations, distances and levels shall be governed by the building.

1.8 MANUFACTURER'S DIRECTIONS

- A. Follow manufacturer's directions in all cases where manufacturers of articles used in this contract furnish directions or prints covering points not shown on drawings or specifications.

1.9 INDUSTRY STANDARDS

- A. Electric operated and/or heated equipment, fabricated or otherwise, shall conform to latest standards of National Electric Manufacturers Association and of Underwriters Laboratories, Inc., and shall bear the U.L. label.
- B. Cooking and hot food holding equipment shall meet minimum construction standards as noted by NSF #4.
- C. Refrigeration equipment shall meet minimum construction standards as noted by NSF #7.
- D. Items of food service equipment furnished shall bear the N.S.F. seal.
- E. Food service equipment shall be installed in accord with N.S.F. standards.
- F. Work and materials shall be in compliance with requirements of applicable codes, ordinances and regulations, including but not limited to those of Occupational Safety and Health Act (OSHA), National Fire Protection Association, State Fire Marshal, State Accident Commission, U.S. Public Health Service, State Board of Health, local health codes, etc.
- G. No extra charge will be paid for furnishing items required by regulations, even though such may not be shown on drawings or called for in these specifications.
- H. Rulings and interpretations of enforcing agencies shall be considered part of regulations.

PART 2 PRODUCTS

2.1 MANUFACTURED EQUIPMENT

- A. All like types of equipment such as all refrigerated and heated cabinets, all ovens, and all mixers shall be by the same manufacturer.

- B. Except as may be specified otherwise under individual item specifications in "Equipment Schedule", all items of standard manufactured equipment shall be complete in accord with manufacturer's standard specification for specific unit or model called for, including finishes, components, attachments, appurtenances, etc., except as follows:
- C. All items of standard equipment shall be that manufacturer's latest model at time of delivery.
- D. Substitutions for manufactured equipment specified will be accorded consideration under terms set forth in "Substitutions - Standards".

2.2 FABRICATED EQUIPMENT

- A. Stainless steel shall be U.S. standard gauges as called for, 18-8, Type 302, or 304 type, No. 4 finish.
- B. Galvanized iron shall be Armco or equal. Framework of galvanized iron shall be welded construction, having welds smooth, and where galvanizing has been burned off, touched up with high grade aluminum bronze.
- C. Legs and crossrails shall be continuously welded, unless otherwise noted, and ground smooth.
- D. Bottom of legs at floor shall be fitted with sanitary stainless steel bullet type foot, with not less than 2" adjustment.
- E. Legs shall be fastened to equipment as follows:
 - 1. To sinks by means of closed gussets. Gussets shall be stainless steel, reinforced with bushing, having set screws for securing legs.
 - 2. To tables and drainboards with closed gussets which shall be welded to stainless steel hat sections or channels, 14 gauge or heavier, exposed hat sections having closed ends.
 - 3. Bracing shall be welded to underside of tops.
- F. Closed gussets shall be a 3" minimum diameter at top, continuously welded to frame members or to sink bottom.
- G. Sinks, unless otherwise specified, shall be furnished with rotary type waste outlets, without connected overflows: Atlantic Brass Works Model 772-RB; Fisher Brass Foundry Model 250A; T&S; or approved equal. Where exposed, furnish wastes chromium plated.
- H. Rolls shall be 1 1/2" diameter, except as detailed contrary, with corners bullnosed, ground and polished.
- I. Seams and joints shall be shop welded. Welds to be ground smooth and polished to match original finish. Materials 18 gauge or heavier shall be welded.
- J. Metal tops shall be one-piece welded construction, unless specified otherwise, reinforced on underside with stainless steel hat sections or channels welded in place. Crossbracing to be not more than 30" on centers.

- K. Drawers to be 18 gauge stainless steel channel type housing and drawer cradle, both housing and cradle being reinforced and welded at corners, housing being secured to underside of table top, and both housing and cradle being sized for and fitted with 18 gauge 20" x 20" x 5" deep stainless steel drawer insert having coved corners. Drawer insert shall be easily removable from cradle without tools or having to remove entire drawer. Drawers to have stainless steel fronts. Provide with recessed flush type stainless steel pulls.
- L. Support drawer on fabricated 14 gauge stainless steel interlocking channel solid delrin ball bearing wheels. Support slides shall be load rated at 200 lb. per pair. Slides to be Component Hardware S52 Series.
- M. Enclosed cabinet type bases shall be made of formed steel sheets reinforced with formed steel sections to create a rigid structure. Steel shall be 18 gauge or heavier. Base shall be welded construction throughout with front rails, mullions, etc., welded to appear as one-piece construction. All exposed sections of interior and exterior shall be stainless steel, and unexposed sections shall be galvanized steel, unless specified contrary.
- N. Doors shall be double cased, unless otherwise noted. Outer pans shall be 18 gauge with corners welded, ground smooth, and polished. Inner pans shall be 20 gauge, fitted tightly into outer pan with sound-deadening material such as Celotex used as core. Two pans shall be tack-welded together with seam solder filled.

Door shall finish approximately 3/4" thick and shall be fitted with flush recessed type stainless steel door pulls. Single pan type doors shall be reinforced and stiffened with closed hat sections.
- O. Hinged doors shall be flush type mounted on heavy duty stainless steel piano or concealed hinges.
- P. Hardware shall be solid materials and except where unexposed or specified contrary, of cast brass, chrome plated. Stampings are not acceptable. Identify all hardware with manufacturer's name and number so that broken or worn parts may be ordered and replaced.
- Q. Fabricate sink compartments with fully coved vertical and horizontal corners. Multiple compartment partition to be double thickness, continuously welded where sheets join at top. Front of multiple compartment sinks to be continuous on exterior. Bottoms shall be creased to drain.
- R. Ends of all fixtures, splashbacks, shelves, etc., shall be finished flush to walls or adjoining fixtures.
- S. Dishtables, drainless, splashbacks and turned-up edges shall have radius bends in all horizontal and vertical corners, coved at intersections.
- T. Rounded and coved corners or radius bends shall be 1/2" radius or longer.
- U. Shelves in fixtures with enclosed bases shall be turned up on back and sides and feathered slightly to insure tight fit to enclosure panels. Bottom shelves shall be made for easy removal unless otherwise noted.

V. Undersides of tops to be coated with heavy-bodied resinous material compounded for permanent, non-flaking adhesion to metal, 1/8" thick, applied after reinforcing members have been installed, drying without dirt-catching crevices.

W. Metal components, unless specified or noted otherwise, to be the following gauges:

Counter and table tops	14 ga.	Stainless Steel
Wall shelves	16 ga.	Stainless Steel
Pipe leg undershelves	16 ga.	Stainless Steel
Drawer fronts	16 ga.	Stainless Steel
Enclosed cabinet bases	18 ga.	Stainless Steel
Sinks and drainboards	14 ga.	Stainless Steel
Legs 1 - 5/8" diameter	16 ga.	Stainless Steel

2.3 HEATING EQUIPMENT

A. Wherever electric heating equipment or thermostat control for such equipment is specified, it shall be complete, and of the materials, size and rating specified within equipment item or details. All such equipment shall be designed and installed to be easily cleaned or to be easily removed for cleaning.

B. Electrical appliances or heating element circuits of 120 volts shall not exceed 1650 watts, unless specifically shown contrary.

2.4 SWITCHES AND CONTROLS

A. Food Service Equipment Contractor shall supply on each motor driven appliance or electrical heating unit suitable control switch of proper type in accord with Underwriter's Code.

B. All internal wiring for fabricated equipment items included, all electrical devices, wiring, controls, switches, etc., built into or forming an integral part of these items shall be furnished and installed by Food Service Equipment Contractor in his factory or building site with all items complete to junction box for final connection to building lines by Electrical Contractor.

C. Provide standard 3-prong plugs to fit "U" slot grounding type receptacles, similar to No. 5262, for all equipment items powered by plugging into 110-120 volts, single phase AC. Also, provide suitable length 3-wire cord for equipment.

2.5 CONNECTION TERMINALS

A. All equipment shall be complete with connection terminals as standardized by equipment manufacturers, except where specified otherwise.

2.6 LOCKS

A. Fit all doors for reach-in refrigerated compartments with locking type latches approved in writing by Architect. Provide master keys.

2.7 LAMINATED PLASTIC

- A. Wherever laminated plastic materials are specified, they shall be Formica, Wilson-Art, Micarta, or approved equal. Veneer all materials using urea base cement, waterproof and heatproof. Rubber base adhesives are not acceptable. Apply materials directly over close-grained plywood such as mahogany or birch. Standard fir plywood is not acceptable. Face exposed surfaces and edges with 1/16" material and corresponding back faces with 1/32" reject material. Place top sheet on and over finished edge.

PART 3 EXECUTION

3.1 GENERAL

- A. Work under this contract and covered under this section of specifications includes but is not limited to:
 - 1. Cutting of holes and/or ferrules on equipment for piping, drains, electrical outlets, conduits, etc. as required to coordinate installation of food service equipment with work of other Contractors on project.
 - 2. Field checking of building and rough-in requirements, and submission of brochures and shop drawings, all as required hereinbefore under "Submittals".
 - 3. Repair of all damage to premises as result of this installation, and removal of all debris left by those engaged in this installation.
 - 4. Having all food service equipment fixtures completely cleaned and ready for operation when building is turned over to Owner.

3.2 INSTALLATION PROCEDURES

- A. Food Service Equipment Contractor shall make arrangements for receiving his custom fabricated and "buy out" equipment and shall make delivery into building as requisitioned by his installation superintendent. He shall not consign any of his equipment to Owner or to any other Contractor unless he has written acceptance from them and has made satisfactory arrangements for the payment of all freight and handling charges.
- B. Food Service Equipment Contractor shall deliver all of his custom fabricated and "buy out" equipment temporarily in its final location, permitting Trades to make necessary arrangements for connection of service lines; he shall then move equipment sufficiently to permit installation of service lines, after which he shall realign his equipment level and plumb, making final erection as shown on contract drawings.
- C. All portable or counter mounted equipment weighing in excess of 25 pounds shall be mounted on 4" stainless steel adjustable legs.
- D. This Contractor shall coordinate his work and cooperate with other trades working at site toward the orderly progress of the project.
- E. Architect or Owner's Agent shall have access at all times to plant or shop in which custom fabricated equipment is being manufactured, from time contract is let until equipment is shipped, in order that progress of work can be checked, as well as any technical problem which may arise in coordination of equipment with building. Any approval given at this point of manufacture shall be tentative, subject to final inspection and test after complete installation.

- F. Food Service Equipment Contractor shall assist Architect, Owner, and/or Owner's Agent in making any desired tests during or prior to final inspection of equipment; he shall remove immediately any work or equipment rejected by Architect, Owner, and/or Owner's Agent, replacing same with work conforming with contract requirements, and shall reimburse mechanical and/or other contractors involved for extra work made necessary by such replacement.
- G. This Contractor shall keep premises free from accumulation of his waste material and rubbish, and at completion of his work shall remove his rubbish and implements, leaving areas of his work broom clean.
- H. This Contractor shall provide and maintain coverings or other approved protection for finished surfaces and other parts of his equipment subject to damage during and after erection. After removal of protective coverings, all field joints shall be ground and polished and entire work shall be thoroughly cleaned and polished.

3.3 TRIMMING AND SEALING EQUIPMENT

- A. Seal completely spaces between all units to walls, ceilings, floors, and adjoining (not portable) units with enclosed bodies against entrance of food particles or vermin by means of trim strips, welding, soldering, or commercial joint material best suited to nature of equipment and adjoining surface material.
- B. Close ends of all hollow sections.
- C. Equipment butting against walls, ceilings, floor surfaces and corners to fit tightly against same; backsplashes or risers which fit against wall to be neatly scribed and sealed to wall with DowCorning # 732 RTV or General Electric clear silicone sealant, wiping excess sealant out of joint to fillet radius. Where required to prevent shifting of equipment and breaking wall seal, anchor item to floor or wall.
- D. Treat enclosed spaces (inaccessible after equipment installation) for vermin prevention in accord with industry practice.

3.4 TESTING AND DEMONSTRATION OF EQUIPMENT

- A. After completion of installation, all equipment using water, gas, and electricity shall be performance inspected and tested by factory certified service agent, including wet test of hood fire suppression systems, if so required. Food Service Equipment Contractor shall document that these inspections have been performed prior to scheduling demonstrations and owner acceptance of equipment.
- B. Food Service Equipment Contractor shall arrange to have all manufactured, mechanically operated equipment furnished under this contract demonstrated by authorized representatives of equipment manufacturers, these representatives to instruct Owner's designated personnel in use, care and maintenance of all items of equipment after same are in working order. Demonstration and instruction shall be held on dates designated by Owner.
- C. Food Service Equipment Contractor shall provide a competent service representative to be present when installation is put into operation.

3.5 EQUIPMENT HANDLING AND STORAGE

- A. Deliver equipment to site, properly crated and protected, and store in safe place, protected from damage until time for installation.

3.6 GUARANTEE

- A. Special Project Warranty: Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, with inadequate and defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required, provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. This warranty shall be in addition to, and not limitation of, the rights the Owner may have against the Contractor under the Contract Documents.

- B. Warranty Period:

1 year from date of Substantial Completion, all new equipment furnished. However, manufacturer's warranty shall prevail when the period is longer than one year.

5 years warranty period on refrigeration compressors.

10 year warranty period on walk-in panels.

3.7 OPERATING AND MAINTENANCE MANUALS

- A. After completion of installation, Food Service Equipment Contractor shall present to Owner three sets of all operating and maintenance manuals, covering all mechanically operated equipment furnished under this contract, each set being neatly bound in looseleaf binder having durable cover.
- B. Include in each binder a list of names, addresses and telephone numbers of local servicing agencies authorized to make necessary repairs and/or adjustments of equipment furnished under this contract.

PART 4 EQUIPMENT SCHEDULE

ITEM 01	COLD STORAGE SHELVING UNIT	QUANTITY AS SCHEDULED
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Provide four-tier polymer shelving unit complete with tubular uprights and having the following features:

- A. Arrange using quantity and size as shown on Plan.
- B. Removable open grid polymer shelf mats on an epoxy coated steel frame with quick adjust corner releases.
- C. (4) wedge connectors.
- D. Antimicrobial product protection.
- E. 600 lb. capacity per shelf.

Exterior door to be equipped with automatic door closer.

Freezer door to be equipped with perimeter heat.

Exterior door(s) to be equipped with cylinder lock having inside safety release feature.

F. Thermometers:

Each compartment to be provided with exterior flush mounted thermometer mounted at eye level to each door, digital type with contactor for hook-up to remote monitoring system.

G. Lights:

Each compartment to be furnished complete with manufacturer's standard light fixture, having tempered glass cover, mounted and pre-wired to switch with pilot light in door section. Extra lights as needed to provide 30 foot candles 30" above floor.

H. Floor: Load rating nominal 1200 lbs./sq. ft. Recessed floor by Food Service Equipment Contractor.

I. Refrigeration System:

Shall be furnished by manufacturer as part of cold storage room assembly, provide each compartment with complete refrigeration system sized to maintain appropriate temperature.

Condensing units to be semi-hermetic air-cooled, remote. Units to have performance and wiring characteristics as scheduled on drawings.

Condensing units to be provided with painted galvanized steel all-weather housing, controls, and crankcase heaters, all suitable for outdoor conditions, and located as shown on drawings.

Unit coolers to be low-silhouette type, mounted at locations shown on drawings. Performance and wiring characteristics to be as scheduled on drawings. Freezer system to be provided with timed electric defrost.

Evaporator drain lines to be provided by this section and extended to floor receptors outside assembly.

Freezer drain lines to be wrapped with heater cable.

Refrigerant piping to be ACR copper tubing, hard temper, with wrought fittings and silver solder joints. Insulate suction lines with 1/2" premolded foamed plastic insulation.

Refrigeration systems to be provided with all required refrigerant piping, insulation, sight glass, vibration eliminator, solenoid(s), dryer, suction line filter, expansion valve(s), thermostat(s) and defrost timers, etc. as necessary for complete installation. Provide pump down control circuit consisting of thermostat and solenoid valve. All components including piping and insulation to be installed using accepted industry standards, manufacturer instructions and first class workmanship.

J. Miscellaneous:

Temperature monitoring system to be provided for both compartments.

Assembly to be installed in floor depression.

Provide trim strips, closure panels, etc., as necessary to trim assembly to adjacent building surfaces.

Provide removable top closure panels with "C" channel rails. Lift-out panel sections to have turn-down edges for strength and are not to exceed 4'-0" in length.

Provide heated pressure relief port in freezer.

Provide sleeves properly located for utility entrance, drain lines, and refrigeration lines, and after lines are installed, fill sleeves with caulking compound, suitable for use in refrigerated spaces.

Cold storage room shall be erected by factory trained and certified installers or shall be supervised by factory personnel. Refrigeration systems shall be furnished by cold storage room manufacturer and installed by factory authorized personnel.

This specification does not constitute a complete description of cold storage assembly, also see plan and detail drawings.

Cold storage room assembly to be as manufactured by Bally, American Panel, Imperial/Brown, or Thermo-Kool, complying with specifications and drawings.

ITEM 03

NOT USED

ITEM 04A SHELIVING UNIT

QUANTITY AS SCHEDULED

Provide four-tier polymer shelving unit complete with tubular uprights and having the following features:

- A. Arrange using quantity and size as shown on Plan.
- B. Removable open grid polymer shelf mats on an epoxy coated steel frame with quick adjust corner releases.
- C. (4) wedge connectors.
- D. Antimicrobial product protection.
- E. 800 lb. capacity per shelf.
- F. Polymer Trilobal Post:
 - 73-3/16"H
 - For use with stem casters
 - Adjusts at 1" increments
 - Corrosion proof all polymer construction with built-in antimicrobial product protection.
- G. Polymer Stem Caster:
 - Brake

- C. 4"H splash on sides and rear.
- D. Stainless steel gussets.
- E. Stainless steel crossrails and tubular legs with adjustable stainless steel bullet feet.

Worktable to be as manufactured by Eagle Group, Model MT3060GT-BS, John Boos, or fabricated equal.

ITEM 07.1 INGREDIENT BIN

- A. 27 gallon capacity.
- B. 1-piece seamless polyethylene bin.
- C. 2-piece sliding polycarbonate lid.
- D. S-hook on front .
- E. (4) 3" heavy duty casters (2 front swivel, 2 fixed).
- F. White with clear cover.

Ingredient bin to be as manufactured Cambro, Model IBS27148, Win-Holt, or Rubbermaid.

ITEM 08 BUN PAN RACK QUANTITY AS SCHEDULED

Provide aluminum pan rack having the following features:

- A. Mobile, end load, single section, pass-thru.
- B. 21-1/2"W x 69-1/4"H, 29"D.
- C. Pass-thru, open sides with slides for (40) 14" x 18" or (20) 18" x 26" pans.
- D. Slides on 3" centers.
- E. Riveted aluminum construction.
- F. Casters.

Pan rack to be as manufactured by Metro, Model RD3N, Cres-Cor or Channel.

ITEM 09 PLANETARY MIXER QUANTITY AS SCHEDULED

Provide gear-driven floor model mixer having the following features:

- A. 20-quart stainless capacity.
- B. (3) fixed speeds plus stir speed.
- C. 15-minute timer.

- F. 60"W x 30"D.
- G. 4-1/2"H backsplash.
- C. 14/300 stainless steel top, box marine edge on front and sides.
- D. Adjustable 18/300 series stainless steel undershelf with marine edge.
- E. Lockable gusset system.
- F. (4) stainless steel legs and adjustable stainless steel bullet feet.
- G. (2) Drawers:
 - 20" x 20" x 5"D
 - Stainless steel with polymer slides
 - Note: table must be field drilled for mounting

Worktable to be as manufactured by Eagle Group, Model T3060SEM-BS, Titan, or fabricated equal.

ITEM 12 ONE (1) COMPARTMENT SINK QUANTITY AS SCHEDULED

Provide one compartment sink with drainboards as follows:

- H. Approximate overall size: 63-1/2"W x 31"D.
- I. 14/304 stainless steel top.
- C. Coved corners.
- D. 24" x 24" x 14" deep compartment.
- E. 36" drainboard on right.
- F. 9-1/2"H backsplash with 1" upturn and tile edge.
- G. 8" OC splash mount faucet holes, rolled edges on front & sides.
- H. 3-1/2" basket lever drain.
- I. Stainless steel crossbracing on all sides, stainless steel legs and adjustable bullet feet.

Sink to be as manufactured by Eagle Group, Model FN2424-1-36R-14/3, Titan, or fabricated equal.

ITEM 12.1 FAUCET

- J. Mixing faucet.
- K. 12" swing nozzle.
- L. Wall mounted.
- M. 8" centers on sink faucet with 1/2" IPS eccentric flanged female inlets.

N. Lever handles.

Faucet to be a manufactured by T&S Brass, Model B-0231, Chicago Faucet, or Fisher.

ITEM 13 WALL MOUNTED SHELF QUANTITY AS SCHEDULED

Provide wall shelf with the following features:

- A. Wall mount, 4'-6" A.F.F.
- B. Arrange using quantity and size as shown on Plan.
- C. 1-1/2"H up-turn on sides and rear.
- D. Stainless steel mounting brackets stud welded to shelf.
- E. 14/304 stainless steel construction.

Wall shelf to be as manufactured by Eagle Group, Model WS1260-14/3, Titan, or fabricated equal.

ITEM 14 HAND SINK N.I.K.C.

This item is to be furnished and installed by Plumber.

ITEM 15 SOILED DISHTABLE QUANTITY AS SCHEDULED

This item to be custom fabricated in accord with General Requirements of specifications and with plan and detail drawings. (20"x20"x5" Pre-Rinse Sink, Scrap Block)

ITEM 15.1 PRE-RINSE FAUCET QUANTITY AS SCHEDULED

Provide pre-rinse faucet having the following features:

- A. Wall mount mixing faucet with 8" adjustable centers.
- B. Quarter-turn Eterna cartridges with spring checks.
- C. Lever handles with color-coded indexes.
- D. 18" riser.
- E. 44" flexible stainless-steel hose with heat resistant gray handle and hold down ring.
- F. 1.15 GPM spray valve (B-0107).
- G. Finger hook.
- H. Polished chrome-plated brass faucet body.
- I. 1/2" NPT female inlets.

J. Installation kit.

Pre-Rinse Faucet Assembly to be as manufactured by T&S Brass, Model B-0133, Chicago Faucet, or Fisher.

ITEM 16 DISHWASHER, CONVEYOR QUANTITY AS SCHEDULED

Provide single-tank rack conveyor type dishmachine, having the following features:

- A. Single tank.
- B. (202) racks/hour.
- C. Insulated hinged doors, see hinging as shown on Plan.
- D. .62 gallon/rack.
- E. Stainless steel enclosure panels.
- F. Microprocessor controls with low temperature and dirty water indicators.
- G. NSF pot and pan mode, energy efficient.
- H. Voltage as scheduled, direct connections:
 - Electric tank heat 15kW
 - Electric booster 30kW
- I. Operation direction as shown on Plan.
- J. Standard height and feet.
- K. For water over 3-grains of hardness, an additional water softener is recommended.
- L. Drain water tempering kit and installation.

Dishmachine to be as manufactured by Hobart, Model CL44EN-BAS, Champion, or Meiko.

ITEM 17 CLEAN DISHTABLE QUANTITY AS SCHEDULED

Provide clean dishtable with the following features:

- J. Straight design, see direction of operation as shown on Plan.
- B. 96"W x 30"D x 43-1/2"H.
- C. 14/304 stainless steel construction.
- D. 8" backplash, raised rolled edges on front and side.
- E. Stainless steel legs and crossrails, adjustable stainless steel feet.

Dishtable to be as manufactured by Eagle Group, Model CDTR-96-14/3, Titan, or fabricated equal.

ITEM 18 THREE (3) COMPARTMENT SINK QUANTITY AS SCHEDULED

Provide three compartment sink with drainboards as follows:

- K. Approximate overall size: 138"W x 35"D.
- L. 14/304 stainless steel top, coved corners.
- C. 20" wide x 28" front-to-back x 14" deep compartments.
- D. (2) 36" drainboards, see direction of operation on Plan.
- E. 9-1/2"H backsplash with 1" upturn and tile edge.
- F. (2) sets of 8" OC splash mount faucet holes, rolled edges on front & sides.
- G. 3-1/2" basket drains.
- H. Stainless steel crossbracing on all sides, stainless steel legs and adjustable bullet feet.
- I. (3) Lever Handle Drains, 1-1/2" or 2" IPS connection.

Sink to be as manufactured by Eagle Group, Model FN2860-3-36-14/3, Titan, or fabricated equal.

ITEM 18.1 FAUCET

- J. Mixing faucet.
- K. 12" swing nozzle.
- L. Wall mounted.
- M. 8" centers on sink faucet with 1/2" IPS eccentric flanged female inlets.
- N. Lever handles.

Faucet to be a manufactured by T&S Brass, Model B-0231, Chicago Faucet, or Fisher.

ITEM 19 OVERSHELF QUANTITY AS SCHEDULED

Provide wall shelf with the following features:

- A. Wall mount at 4'-6" A.F.F.
- B. Arrange using quantity and size as shown on Plan.
- C. Rolled front edge, 1-1/2"H up-turn on sides and rear.
- D. 304 stainless steel pot rack bar.
- E. (11) double-prong stainless steel hooks.

F. 16/430 stainless steel construction.

Wall shelf to be as manufactured by Eagle Group, Model WSP12132, Titan, or fabricated equal.

ITEM 20 UTILITY DISTRIBUTION SYSTEM QUANTITY AS SCHEDULED

Provide island utility chase to serve items under exhaust hood, having the following features:

- A. Stainless steel construction.
- B. U L label.
- C. Water tight electrical receptacles to match equipment.
- D. 3/4" hot water and cold water manifold with tees and shut-off valves.
- E. Water quick disconnects and appropriate cord and plug sets as required by equipment for installation under Division 22 and 26.
- F. Length as shown on drawings, with utilities coming from above.
- G. Note: Cord and plugs must not interfere with placement of equipment. If angled plugs can't be used, equipment is to be hardwired using elbow at face plate.
- H. All receptacles shall be GFCI type.

Utility chase to be as manufactured by Captive-Aire, Model UDI, Gaylord, or Avtec.

ITEM 21 EXHAUST HOOD QUANTITY AS SCHEDULED

Provide island type canopy exhaust hood of size, shape and content as shown on detail drawings, having the following features:

- M. All exposed surfaces of 18 gauge 304 Series, 18-8 stainless steel construction.
- N. N.F.P.A. 96 construction, including all joints and seams welded externally, continuous and liquid tight.
- O. 5/8" diameter hanger rods to structural ceiling, approximately 96" on center.
- P. Stainless steel high-efficiency baffle type U.L. classified grease extracting filters, with handles.
- Q. Integral grease gutter sloped to drain to grease receptacle.
- R. Vapor-proof U.L. listed recessed LED light fixtures.
- S. Coordinated installation of fire suppression system as specified for Item 22, provide cabinet at end of hood.

- H. Integral make-up air plenum along front as shown with dual stream plenum for air conditioning. LED lights included.
- I. Air conditioned portion of plenum insulated to prevent condensation.
- J. Removable stainless steel perimeter trim and/or closure panels from top of hood to ceiling.
- K. Food Service Equipment Contractor shall provide and install any secondary supporting members required to suspend exhaust hoods. Hood supports shall include seismic bracing, if required, installed in accord with SMACNA guidelines.
- L. Fire suppression cabinet with pre-wired control package and switches with variable speed fan control.

Exhaust hood to be as manufactured by Captive-Aire, Model ND2-PSP, Gaylord, or Avtec.

ITEM 22 FIRE SUPPRESSION SYSTEM QUANTITY AS SCHEDULED

Provide automatic wet chemical fire suppression system as required to protect exhaust hood, Item 21, and the cooking equipment located under this hood, and having the following features:

- A. All tanks, control heads, piping, relays, cable, fusible links, nozzles, elbows, etc., as required for complete system.
- B. Brass nozzles and chrome plated or sleeved exposed piping.
- C. Manual strike mechanism in accessible location.
- D. Installation in accord with N.F.P.A. 17A code requirements and coordinate with exhaust hood construction and installation.
- E. Four contacts for use by E.C., one contact for alarm, one for supply fan shut-off, one for shunt trip actuation, and one spare.
- F. Provide mechanical gas solenoid valve loose for installation by Plumber.

Fire suppression system to be as manufactured by Ansul, Model R-102, Range Guard, or Pyro-chem.

ITEM 23.1 COMBI OVEN, ELECTRIC QUANTITY AS SCHEDULED

Provide combi-oven with the following features:

- T. Electric.
- B. Boiler-free, countertop combi oven.
- C. (10) 18" x 26" full size sheet pan or (20) 12" x 20" x 1" hotel pan capacity.
- D. 9" control panel, 20 stages each & 399 cooking recipes storage.
- E. (4) cooking modes: hot air, steam, combi-steam and retherm.

- F. External multi-point core temperature probe with external socket.
- G. 5-speed auto reversing fan.
- H. (5) wire racks.
- I. Disappearing door with anti-microbial hygienic door handle, see hinging as shown on Plan.
- J. Pull-out spray hose.
- K. Automatic hands-free cleaning system.
- L. Stainless-steel construction.
- M. Energy efficient.
- N. Voltage as scheduled, cord and plug.
- O. Verification of required water testing or RO system.
- P. Optipure Water Filter System:
 - CTO-Q10 cartridge
 - CTO-QCR cartridge
 - 2.5 gpm
 - 0.5 micron sediment and chlorine up to 20,000 gallons
 - 0.5 chloramine up to 6,000 gallons
 - Pressure gauge
 - Inlet shut-off valve
 - Mounting bracket
 - For use with steam & combi ovens
- Q. Stacking Kit on 6" Legs:
 - For 6.20 on 6.20 (6.20 on 10.20) (electric models)
 - 12" leg is recommended. Only use the 6 inch leg in cases where the hood height is too low to accommodate a 12" leg
- R. Convotherm 4 Stacking Kit Installation.
- S. Back flow preventer.

Combi-Oven to be as manufactured by Convotherm, Model C4ET 10.20ES, Alto-Shaam, or Rational.

ITEM 23.2 COMBI OVEN, ELECTRIC QUANTITY AS SCHEDULED

Provide combi-oven with the following features:

- T. Electric.
- U. Boiler-free, countertop combi oven/steamer.
- V. (6) 18" x 26" full size sheet pan or (12) 12" x 20" x 1" hotel pan capacity.

- W. 9” control panel, 20 stages each and 399 cooking recipes storage.
- X. (4) cooking modes: hot air, steam, combi-steam and retherm.
- Y. External multi-point core temperature probe with external socket.
- Z. (3) wire racks.
- AA. 5-speed auto reversing fan.
- BB. Disappearing door with anti-microbial hygienic door handle, see hinging as shown on Plan.
- CC. Pull-out spray hose.
- DD. Automatic hands-free cleaning system.
- EE. Stainless-steel construction.
- FF. Energy efficient.
- GG. Voltage as scheduled, cord and plug.
- HH. Verification of required water testing or RO system.
- II. Optipure Water Filter System:
 - CTO-Q10 cartridge
 - CTO-QCR cartridge
 - 2.5 gpm 0.5 micron sediment and chlorine up to 20,000 gallons
 - 0.5 chloramine up to 6,000 gallons
 - Pressure gauge
 - Inlet shut-off valve
 - Mounting bracket
 - For use with steam & combi ovens

JJ. Water Filtration Installation.

KK. Back flow preventer.

Combi-Oven to be as manufactured by Convotherm, Model C4ET 6.20ES, Alto-Shaam, or Rational.

ITEM 24 MEAT SLICER QUANTITY AS SCHEDULED

Provide slicer having the following features:

- A. Automatic, heavy duty 13” removable knife with removable tool.
- B. Burnished finish.
- C. Three (3) stroke lengths and four (4) stroke speeds.
- D. Removable meat grip assembly.

- E. Removable ring guard cover.
- F. Product fence.
- G. Single action top mounted sharpener with Borazon™ stones.
- H. Manual lift lever.
- I. Voltage as scheduled, cord and plug.

Slicer to be as manufactured by Hobart, Model HS7-1, Berkel, or Globe.

ITEM 25 MOBILE ENCLOSED CABINET QUANTITY AS SCHEDULED

Provide aluminum pan rack having the following features:

- A. Mobile, reach-in.
- B. 21-1/2"W x 63-1/4"H, 28"D.
- C. Capacity (35) 18" x 26" sheet pans.
- D. Riveted aluminum construction.
- E. Lockable door.
- F. Casters.

Pan rack to be as manufactured by Metro, Model CD3N, Cres-Cor or SPG.

ITEM 26 STEAMER, CONVECTION, ELECTRIC QUANTITY AS SCHEDULED

Provide two-compartment pressureless steamer having the following features:

- U. Electric
- B. Boilerless generator, double stacked.
- C. Open leg stand with flanged feet.
- D. (10) 12 x 20 x 2-1/2" pans capacity per compartment.
- E. Door, see hinging as shown on Plan.
- F. Stainless steel interior and exterior.
- G. Voltage as scheduled, (2) direct connections (for top steamer and bottom steamer each).
- H. K-12 second year check-up.
- I. Water treatment kit (for scale control only).

- J. Drain Tempering Valve:
 - For 140 degree drain temperature requirement
 - Requires 1/2" cold water connection
 - No electrical connection required

- K. Plumbing:
 - Top Steamer: Main water connection
 - Top Steamer: Condensate water connection
 - Bottom Steamer: Main water connection
 - Bottom Steamer: Condensate water connection

- L. Backflow prevention device.

Steamer to be by Groen, Model (2)SSB-10EF, Cleveland, or Vulcan.

ITEM 27 TILT SKILLET QUANTITY AS SCHEDULED

Provide electric tilting skillet braising pan having the following features:

- A. Electric, 30-gallon capacity
- B. Modular enclosed cabinet base
- C. Standard with hydraulic hand tilt with quick lowering feature.
- D. Stainless steel construction
- E. Spring-assisted cover and gallon markings
- F. Food strainer
- G. Stainless steel level adjustable feet
- H. Performance start-up and water quality check.
- I. Double Pantry Faucet:
 - 3/4" swing spout & mounting bracket
 - Mounts on right side of unit (add 4.5" to width)
 - Cleveland DPK14 (Chicago Faucet or Fisher)

J. Food Strainer.

K. Voltage as scheduled, cord and plug.

Electric tilting skillet braising pan to be as manufactured by Cleveland, Model SEM30TR, Market Forge, or Groen.

ITEM 28 FLOOR TROUGH QUANTITY AS SCHEDULED

Provide floor trough having the following features:

- A. Anti-Splash Floor Trough, 36"W x 18"D.

- B. Stainless steel subway-style grating.
- C. 6" deep trough pan with built-in pitch toward drain.
- D. Accommodates up to a 4" diameter drain pipe.
- E. Stainless steel removable perforated basket.
- F. All-welded 14/304 stainless steel construction.

Floor trough to be as manufactured by Eagle Group, Model ASFT-1836-SG, IMC Teddy, or fabricated equal.

ITEM 29 TWO (2) COMPARTMENT SINK QUANTITY AS SCHEDULED

Provide two compartment sink with drainboards as follows:

- V. Approximate overall size: 100"W x 31"D.
- W. 14/304 stainless steel top, coved corners.
- C. 24" wide x 24" front-to-back x 14" deep compartments.
- D. (2) 24" drainboards, see direction of operation on Plan.
- E. 9-1/2"H backsplash with 1" upturn and tile edge.
- F. (2) sets of 8" OC splash mount faucet holes, rolled edges on front and sides.
- G. (2) 3-1/2" basket lever drains.
- H. Stainless steel crossbracing on all sides, stainless steel legs and adjustable bullet feet.
- I. (2) Lever Handle Drains, 2" NPS connection and overflow.

Sink to be as manufactured by Eagle Group, Model FN2448-2-24-14/3, Titan, or fabricated equal.

ITEM 29.1 WALL MOUNTED SHELF

- J. Wall-mounted at 4'-6" A.F.F.
- K. 60"W x 12"D.
- L. Rolled front edge.
- M. 1-1/2"H up-turn on sides and rear.
- N. Stainless steel mounting brackets stud welded to shelf.
- O. 14/304 stainless steel construction.

Shelf to be as manufactured by Eagle Group, Model WS1260-14/3, Titan, or fabricated equal.

ITEM 29.2 FAUCET

- P. Mixing faucet.
- Q. 12" swing nozzle.
- R. Wall mounted.
- S. 8" centers on sink faucet with 1/2" IPS eccentric flanged female inlets.
- T. Lever handles.

Faucet to be as manufactured by T&S Brass, Model B-0231, Chicago Faucet, or Fisher.

ITEM 30 HOSE REEL QUANTITY AS SCHEDULED

Provide hose reel having the following features:

- X. 3/8" x 50 ft. hose with 1.15 GPM spray valve.
- B. 8" wall mount mixing faucet.
- C. Adjustable centers.
- D. Quarter-turn Eterna cartridges with spring checks.
- E. Lever handles with color coded indexes.
- F. Easy to install 16" and rigid 40" risers.
- G. 36" flexible water hose connector with stainless steel quick disconnect.
- H. Ratcheting system and adjustable hose bumper.
- I. (2) 2-3/8" wall brackets.
- J. Stainless steel hose reel.
- K. 1/2" NPT.

Hose reel assembly to be as manufactured by T&S, Model B-1444-CV, with above components Chicago Faucet, or Fisher.

ITEM 31 ICE MAKER QUANTITY AS SCHEDULED

Provide ice maker and bin having the following features:

- Y. Cube style.
- Z. Air cooled, self-contained condenser, R410A refrigerant.

- C. 30"W x 24"D x 21-1/2"H.
- D. Capacity up to 490 lb./24 hours at 70°/50° (378 lb. AHRI certified at 90°/70°).
- E. Stainless steel finish, corrosion, fingerprint and dirt resistant.
- F. Half-dice size cubes.
- G. Energy efficient.
- H. Voltage as scheduled, direct connection.
- I. Drain.
- J. Water Pre-Filter Assembly:
 - 5 micron filtration includes head, shroud, hardware, mounting assembly
 - filter cartridge
 - Not stand-alone; should be used in conjunction with primary water filter assembly

Unit to be as manufactured by Manitowoc, Model IYT0450A, Scotsman, or Hoshizaki.

ITEM 31.1 ICE BIN

- K. 30"W x 34"D x 50"H.
- L. Side-hinged front-opening door.
- M. Side grips.
- N. AHRI certified 532 lb. ice storage capacity (17.9 cu. ft.).
- O. For top mounted ice maker
- P. Stainless steel finish, corrosion, fingerprint and dirt resistant.
- Q. Legs, 6" adjustable stainless steel.
- R. Backflow prevention device.

Bin to be as manufactured by Manitowoc, Model D570, Scotsman, or Hoshizaki.

ITEM 32 PASS-THRU REFRIGERATOR QUANTITY AS SCHEDULED

Provide two-section pass-thru refrigerator with top mounted air-cooled condensing unit, exterior digital thermometer, cylinder door locks and top mounted condensate evaporator, having the following features:

- A. Self-contained refrigeration.
- B. 48.0 cu. ft. capacity.
- C. (8) half-height solid doors, Santoprene door gaskets, hinged as shown on drawings for

- Control/ Kitchen side and Rear/ Server side.
- D. (6) silver freeze (chrome-style) shelves.
- E. Stainless steel exterior, aluminum interior.
- F. Standard depth cabinet.
- G. Electronic temperature touch control/indicator.
- H. LED lighting.
- I. Expansion valve technology.
- J. Stainless steel breakers.
- K. 1/3 HP.
- L. Voltage as scheduled, cord and plug.
- M. Casters.

Refrigerator to be as manufactured by Victory, Model RSA-2D-S1-PT-HD, Traulsen, or Delfield.

ITEM 33 PASS-THRU HEATED CABINET QUANTITY AS SCHEDULED

Provide one-section pass-thru hot cabinet, having the following features:

- A. 21.5 cu. ft. capacity.
- B. (4) half-height solid doors, hinged as shown on drawings for Control/ Kitchen side and Rear/ Server side.
- C. (3) silver freeze (chrome-style) shelves.
- D. Standard depth cabinet.
- E. Exterior digital touch control system.
- F. Cylinder locks.
- G. Stainless steel exterior, aluminum interior.
- H. Casters.
- I. Voltage as scheduled, cord and plug.

Cabinet to be as manufactured by Victory, Model HSA-1D-1-PT-HD, Delfield, or Traulsen.

ITEM 34 MILK COOLER QUANTITY AS SCHEDULED

Provide mobile carton milk cabinet having the following features:

- A. Normal temperature.
- B. 49"W x 30-5/8"D x 41-1/8"H.
- C. 20.32 cu. ft.
- D. Single access.
- E. Flat top carton capacities.
- F. (12) 13" x 13" x 11" or (8) 19" x 13" x 11" case capacity.
- G. Self-latching doors/lids with safety bumpers.
- H. Cylinder lock.
- I. Wire floor racks.
- J. Floor drain.
- K. Electronic control.
- L. Auto defrost.
- M. Stainless steel interior and exterior.
- N. Self-contained refrigeration, R290 Hydrocarbon refrigerant.
- O. 4" heavy duty casters, (2) with brakes.
- P. 1/3 H.
- Q. Voltage as scheduled, cord and plug.

Dispenser to be as manufactured by Beverage-Air, Model SM49HC-S, True, or Norlake.

ITEM 35 HOT FOOD SERVING COUNTER QUANTITY AS SCHEDULED

Provide modular serving counter having the following features:

- A. Hot food unit, electric.
- B. 74-3/8"W x 30"D x 36"H.
- C. (5) 12" x 20" hot wells.
- D. Wet and dry operation.
- E. Individual digital controls.
- F. Stainless steel top.

- G. Fully enclosed molded fiberglass base, color as selected by Architect/Owner.
- H. (4) 5" locking swivel casters.
- I. Voltage as scheduled, cord and plug.
- J. (Z) Hot food drains.
- K. Install in banked line-up as shown on drawings.
- L. (AA) line up lock.
- M. (A) Solid tray slide with (3) inverted "V" ridges on surface, stainless steel.
- N. Single service buffet sneeze guard, hinged; verify with Owner.
- O. (RR) LED lights.
- P. Tray slide to be 30"H.
- Q. Work board on staff side.

Hot food counter to be by Colorpoint, Model EF5-CPA-EB, Delfield, or Duke.

ITEM 36 COLD FOOD SERVING COUNTER QUANTITY AS SCHEDULED

Provide cold food counter module having the following features:

- AA. Cold food unit, electric.
- B. 60-3/8"W x 30"D x 30"H.
- C. (1) 51"W x 20"D x 9" deep stainless steel cold well.
- D. Accommodates (4) full size 6" deep food pans.
- E. Forced air refrigeration with (2) fans.
- F. Fully enclosed molded fiberglass base, color as selected by Architect/Owner.
- G. 5" casters all with brakes.
- H. (AA) Line up lock.
- I. (A) Solid tray slide with (3) inverted "V" ridges on surface, stainless steel.
- J. Single service buffet sneeze guard, hinged; two tier display.
- K. 12" extension
- L. Install in banked line-up as shown on drawings.

- M. Tray slide to be 30"H.
- N. (RR) LED lights.
- O. (Y) Hinged door.
- P. Voltage as scheduled, cord and plug.
- Q. (D) Cutting board.

Counter to be by Colorpoint, Model 66-CFMA, Delfield, or Duke.

ITEM 37 SERVING COUNTER, UTILITY QUANTITY AS SCHEDULED

Provide modular serving counter of size and content as shown on Plan drawings, having the following features:

- A. Solid Utility Food Table.
- B. Flat stainless steel top.
- C. 60-3/8"W x 30"D x 30"H.
- D. Fully enclosed molded fiberglass base, color as selected by Architect/Owner.
- E. 5" casters all with brakes.
- F. Tray slide to be 30"H.
- G. (AA) Line up lock.
- H. (A) Solid tray slide with (3) inverted "V" ridges on surface, stainless steel.
- I. Install in banked line-up as shown on drawings.

Counter to be as manufactured by Colorpoint, Model 60-ST-EB, Delfield, or Duke.

ITEM 38 CASHIER COUNTER QUANTITY AS SCHEDULED

Provide modular cashier counter having the following features:

- A. Cashier Station, single end station.
- B. 36-3/8"W x 30"D x 36"H.
- C. Stainless steel top.
- D. Molded fiberglass base, color as selected by Architect/Owner.
- E. 5" casters all with brakes.

- E. Lever activated.
- F. Lighted merchandiser with "ice" graphics.
- G. Leg kit and drain kit.
- H. Stainless steel exterior.
- I. Water dispenser.
- J. Voltage as scheduled, cord and plug.

Unit to be as manufactured by Manitowoc, Model S-150-2704811, Cornelius, or Follett.

END OF SECTION 11 40 00

SECTION 12 21 13
HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes horizontal metal slat louver blinds and operating hardware.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Product Data: Submit data indicating physical and dimensional characteristics, and operating features.
- C. Shop Drawings: Indicate opening sizes, tolerances required, method of attachment, clearances, and operation.
- D. Samples for Initial Selection: For each finish product specified, submit two sets of samples representing manufacturer's full range of available finishes, colors and patterns for all exposed components of product.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selection. Samples to be presented on actual product sections no less than 12 inches long.
- F. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.

1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.
- B. Installer: Company specializing in installing products specified in this section with minimum five (5) years documented experience.

1.4 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.5 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work with window installation and placement of concealed blocking to support blinds.

1.6 EXTRA MATERIALS

- A. Section 01 77 00 - Closeout Procedures: Extra materials, spare parts and maintenance products.
- B. Extra Blind Assemblies: Two of each size.
- C. Extra Slats: 20 of each type and size.
- D. Extra Lift Cords, Control Cords, and Wands: One of each type.

PART 2 PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS

- A. Manufacturers:
 - 1. Bali Window Treatments.
 - 2. Caco, Inc.
 - 3. Hunter Douglas Window Fashions.
 - 4. Levolor Contract.
 - 5. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

- A. Blinds: Horizontal slat louvers hung from full-width headrail with full-width bottom rail; between the window jambs; manual control of raising and lowering by cord with full range locking; variable blade angle adjustable by control wand.
- B. Metal Slats: Spring tempered pre-finished aluminum; radiused slat corners, with manufacturing burrs removed.
 - 1. Width: 1 inch.
 - 2. Thickness: 0.008 inch.
 - 3. Color: As selected by Architect from submitted samples.
- C. Slat Support: Woven polypropylene cord, ladder configuration.
- D. Headrail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats; height 1-7/8 inches.
 - 1. Color: Same as slats.
- E. Bottom Rail: Pre-finished, formed aluminum with top side shaped to match slat curvature; with end caps.
 - 1. Color: Same as slats.
- F. Lift Cord: Braided polypropylene; continuous loop.
 - 1. Free end weighted.
 - 2. Color: As selected by Architect from submitted samples.
- G. Control Wand: Extruded hollow plastic; round shape.
 - 1. Non-removable type.
 - 2. Length of window opening height less 3 inches.
 - 3. Color: Clear.
- H. Headrail Attachment: Wall brackets, or as otherwise indicated on Drawings.
- I. Accessory Hardware: Type recommended by blind manufacturer.

2.3 FABRICATION

- A. Fabricate blinds to fit within openings with uniform edge clearance of 1/4 inch.
- B. At openings requiring multiple blind units, fabricate separate blind assemblies with space of 1/2 inch between assemblies, occurring at window mullion centers.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

- B. Verify openings are ready to receive work.
- C. Verify structural blocking and supports are correctly placed.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this Section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.
- B. Install blinds.
- C. Secure in place with flush countersunk concealed fasteners.
- D. Place intermediate head supports at 24 inch o.c., or closer for adequate support of imposed operating loads.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Gap at Window Opening Perimeter: 1/8 inch.
- C. Maximum Offset From Level: 1/8 inch.

3.5 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust blinds for smooth operation.

3.6 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean blind surfaces just prior to occupancy.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protect installed construction.

END OF SECTION

SECTION 12 32 16

MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manufactured plastic-laminate-clad casework.
 - 2. Countertops.
 - 3. Casework hardware.
- B. Related Requirements:
 - 1. Section 09 65 00 - Resilient Flooring: Rubber base.
 - 2. Division 22 - Plumbing Fixtures: Sinks set in countertops.

1.2 DEFINITIONS

- A. Identification of Casework Parts by Surface Visibility:
 - 1. Unit Body Open Interiors: Any storage unit surface without solid door or drawer fronts and units with glass sliding or glass framed doors.
 - 2. Unit Body Closed Interiors: Any storage unit surface behind solid door or drawer fronts.
 - 3. Unit Body Exposed Side: Any storage unit exterior side surface that is visible.
 - 4. Concealed Surfaces: Any surface not normally visible after installation.

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. Architectural Woodwork Manufacturers Association of Canada (AWMAC) and the Woodwork Institute (WI):
 - 1. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, 2017.
 - 2. WI (GIS) - Guarantee and Inspection Service.
 - 3. WI (CCP) - Certified Compliance Program.
 - 4. WI (CSIP) - Certified Seismic Installation Program.
 - 5. WI (MCP) - Monitored Compliance Program.
- C. California Department of Health Services:
 - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- D. American National Standards Institute (ANSI):
 - 1. ANSI A135.4 - Basic Hardboard Standard; 2012.
 - 2. ANSI A208.1 - Particleboard; 2016.
- E. Forest Stewardship Council (FSC):
 - 1. FSC Guidelines - Forest Stewardship Council Guidelines.
- F. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA LD 3 - High Pressure Decorative Laminates.
- G. South Coast Air Quality Management District (SCAQMD):
 - 1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data describing casework finishes and construction.
- C. Shop Drawings:
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
 - 2. Provide the information required by AWMAC/WI (NAAWS) and to include the following:
 - a. Indicate component dimensions, configurations, elevations, cross-sections, construction details, joint details, service run spaces and location of services. Include layout of units with relation to surrounding walls, doors, windows and other building components.
 - b. Include details for fabrication of vanity and countertop supports, brackets and finishes.
- D. Samples for Initial Selection: Two manufacturer's color samples illustrating the full range of finishes, patterns and colors available for each finish surface type, trim and hardware indicated; submit for Architect's initial selections.
- E. Samples for Verification: From the Architect's initial selections, prepare and submit two samples for each selected finish, pattern and color; minimum 4 x 4 inch samples and actual hinge and pull. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

1.6 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience.
- B. Installer: Company specializing in the installation of casework with minimum five (5) years documented experience and approved by the manufacturer.
- C. Work is to comply with AWMAC/WI (NAAWS) standards.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Store completed casework and countertops in a ventilated space with relative humidity range of 20 to 50 percent.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install casework in unconditioned spaces, or in spaces where relative humidity is not within acceptable limits.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 QUALITY STANDARD

- A. Custom Grade, in accordance with AWMAC/WI (NAAWS), unless noted otherwise.

2.2 MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK

- A. Manufacturers:
 - 1. Biggs Casework, Inc.
 - 2. Blair-Dumond, Inc.
 - 3. Cabinets by Design, Inc., Duluth GA.
 - 4. Case Systems.
 - 5. Cleora Sterling Corporation.
 - 6. Interior Wood Specialties, Inc.
 - 7. Kewaunee Scientific Corporation.
 - 8. Pridgen Cabinetworks.
 - 9. Stevens Industries Inc.
 - 10. TMI Systems Design Corporation.
 - 11. Substitutions: Section 01 60 00 - Product Requirements.

2.3 COMPONENTS

- A. Particleboard: ANSI A208.1; 45 pound density, fir or pine.
 - 1. Interior Composite Wood Products: Conform to California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
 - 2. Use Moisture Resistant Particleboard on countertops in wet areas and at sinks.
- B. Hardboard: ANSI A135.4; prefinished; 1/4 inch thick.
- C. Melamine: Thermally Fused Melamine resin, NEMA LD 3, Type VGL laminate panels. Colors to be selected by Architect from manufacturer's full range of options.
- D. PVC Edging: Extruded PVC, self-locking serrated tongue, of width to match component thickness. Colors to be selected by Architect from manufacturer's full range of options.
 - 1. Convex face with smooth finish.
- E. Plastic Laminate: High Pressure Decorative Laminate (HPDL), NEMA LD-3. Colors to be selected by Architect from manufacturer's full range of options.
- F. Plastic Laminate Backing: High pressure paper base laminate, 0.020 inch thick, smooth surface finish.
- G. Solid Surface (Synthetic Surface):
 - 1. Provide finished products having flame spread index of 35 and smoke developed index of 15, when tested in accordance with ASTM E84 in thickness of 3/4 inch.
 - 2. Resin: Polyester type, with integral coloring, stain resistant to domestic chemicals and cleaners.
 - 3. Polishing Cream: Compatible polishing cream to achieve specified finish sheen.
 - 4. Adhesive: Type recommended by solid surface manufacturer and coordinated for bonding to substrate type.
- H. Cabinet Hardware:
 - 1. Pulls:

- a. 4 inch centers.
 - b. Finish:
 - 1) Powder coated wire; color as selected by Architect from manufacturer's full range of options.
 2. Hinges: Heavy duty, exposed 5 knuckle, fixed pin, hospital-tip style; color and finish to match Pulls.
 - a. Finish:
 - 1) Powder coated steel.
 3. Coat Hooks: Double prong; stainless steel; color and finish to match Pull.
 4. Magnetic Catches: Aluminum case with zinc plated steel strike, 6 lb. pull minimum.
 5. Door & Drawer Locks: Cam type, disc tumbler capable of being master keyed; stainless steel, satin finish. Each room, keyed alike and separate from other rooms and all locks master keyed.
 - a. Drawers:
 - 1) Lock on each drawer.
 - b. Doors:
 - 1) Single Door - Lock on each leaf.
 - 2) Pair Door - Interior release/latch on one leaf; lock on other leaf.
 6. Hardware Fasteners: Exposed fasteners to match material and finish of installed device.
 7. Where door opens against adjacent construction, provide chain or other restraint device to prevent door and door hardware from contacting adjacent construction.
 8. Drawer Slides:
 - a. Standard Drawers: Nylon ball bearing, self closing; 75 pound capacity.
 - b. File Drawers: Full extension, ball bearing, self closing; 100 pound capacity.
 9. Adjustable Shelf Supports:
 - a. Heavy duty, polycarbonate; clear; pin type; shelf locking clip.
 10. Casters: Double ball bearing mounting to heavy gage zinc plated fork; 5 inch soft rubber wheels. Provide two brake units per mobile unit.
- I. Fixed Vanity and Countertop Brackets:
1. Brackets to comply with Americans with Disabilities Act (ADA) where applicable.
 2. Material:
 - a. Stainless steel.
 3. Finish:
 - a. Brushed.
- J. Bolts, Nuts, Washers, Lags, Anchors, Pins, Fasteners, and Screws: As indicated on Drawings and otherwise to be of size and type to suit application; galvanized finish in concealed locations and stainless steel in exposed locations.

2.4 FABRICATION

- A. Fabricate laminate clad casework to dimensions, profiles and details shown.
- B. Cabinet Joinery: Industrial grade hardwood dowels, glued and clamped tight.
- C. Construct cabinet bodies with 3/4 inch particleboard for sides, fixed intermediates, subtops, and bottoms. Stretchers, where allowed, to be minimum 4 inch wide.
 1. Subtops to be solid particleboard; no stretchers allowed for subtops.
- D. Construct shelving up to 30 inches wide with 3/4 inch particleboard. Construct shelving over 30 inches wide with 1 inch particleboard.
- E. Construct cabinet backs with 1/2 inch particleboard.

- F. Construct drawers with 1/2 inch particleboard for sides, back, and subfront. Construct drawer bottoms with 1/4 inch prefinished hardboard.
- G. Construct doors, and drawer fronts with 3/4 inch particleboard.
- H. Construct countertops as follows:
 - 1. Use 1-1/8 inch particleboard for countertops finished with Plastic Laminate.
 - 2. Use 3/4 inch particleboard for countertops finished with Solid Surface (Synthetic Surface) type material.
 - 3. Use Moisture Resistant Particleboard in wet areas and countertops with sinks.
- I. All components to be of balanced construction. Plastic laminate faced particleboard to be balanced with high pressure cabinet liner on opposite side unless otherwise noted. Melamine faced particleboard to be balanced with melamine.
- J. Wall Hung Units:
 - 1. Top surfaces of wall hung units to be finished with same material as visible vertical end panels.
 - 2. Bottom surfaces of wall hung units to be finished with melamine on surfaces and color matching PVC panel edges.

2.5 FINISHES

- A. Door and Drawer Fronts: Plastic laminate VCS28 with 3mm PVC edges.
- B. Unit Body Closed and Open Interiors: Melamine with 1mm PVC edges. Exposed sides to be plastic laminate VGS28 with 0.5 mm PVC edges. Shelves to have melamine on both sides with 1mm PVC edges. Exposed shelf edges for Open Interior units to be 3 mm PVC.
- C. Drawers: Melamine with 1mm PVC edges.
- D. Countertops:
 - 1. Plastic Laminate Clad Type: HGS/HGP48 with 3mm PVC edges. Refer to Drawings.
 - a. Colors:
 - 1) As selected by Architect from manufacturer's full range of options.
 - 2. Solid Surface Type: Solid Surface (Synthetic Surface). Refer to Drawings.
 - a. Colors:
 - 1) As selected by Architect from manufacturer's full range of options.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.
- B. Verify adequacy of backing and support framing.
- C. Verify location and sizes of utility rough-in associated with work of this Section.

3.2 PREPARATION

- A. Section 01 73 00 - Execution: Prepare field conditions and existing construction for installation of work of this section.
- B. Prepare materials to be installed and equipment to be used during installation.

3.3 INSTALLATION

- A. Section 01 73 00 - Execution: Related to installation of Work.

- B. Install work in accordance with AWMAC/WI (NAAWS) requirements for grade indicated.
- C. Set and secure casework in place; rigid, plumb, and level.
- D. Use fixture attachments in concealed locations for wall mounted components.
- E. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.
- F. Carefully scribe casework abutting other components and construction, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- G. Secure cabinets, brackets and bases to floor and wall substrates using appropriate angles and anchorages.
- H. Seal joints at abutment to other construction with appropriate sealant matching casework finish.
- I. Sequence installation and erection to ensure mechanical and electrical connections are achieved in an orderly and expeditious manner.

3.4 ADJUSTING

- A. Section 01 73 00 - Execution: Starting, testing, adjusting, and balancing.
- B. Adjust moving or operating parts to function smoothly, without binding and correctly.
- C. Repair or remove and replace defective work to new condition.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Procedures: Related to cleaning.
- B. Clean casework, counters, shelves, hardware, fittings, and fixtures.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 73 00 - Execution: Protecting installed construction.
- B. Protect Work from damage, including damage from detrimental air temperature and humidity levels.

END OF SECTION